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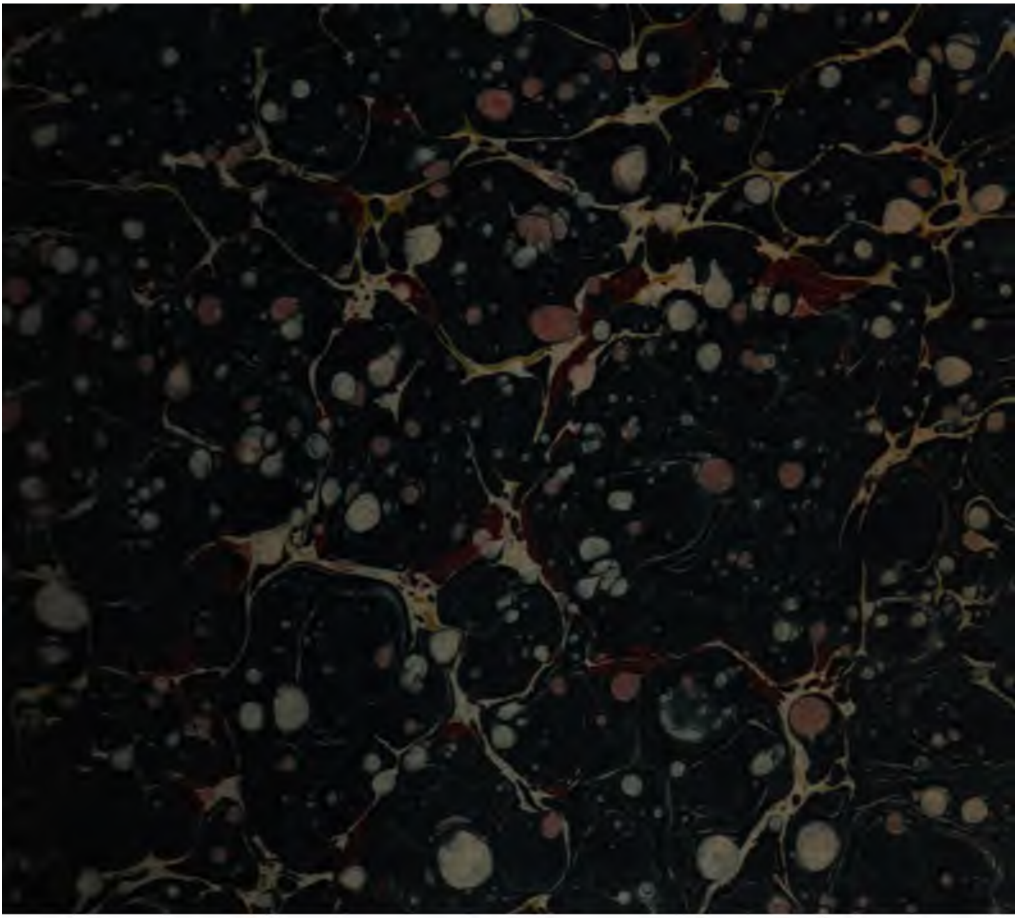

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PROCEEDINGS

OF THE

CALIFORNIA ACADEMY

OF

SCIENCES.

REPORT ON SOME MEXICAN HYMENOPTERA, PRINCIPALLY FROM LOWER CALIFORNIA.

BY WILLIAM J. FOX.

The collections on which this paper is based were made principally throughout Lower California. I say throughout, as collections were made, beginning at San Quintin in the north, to San José del Cabo in the extreme south, as well as in divers localities in the east and west, such as Magdalena Island and San Juan. The collection as a whole, though not very extensive, is, in my opinion, one of the most important that has ever been brought from that region, as not only do the specimens bear the precise locality in which they were collected, but have the date of capture as well, which, as every entomologist must admit, is not only interesting but important. To Mr. Gustav Eisen, of the California Academy of Sciences, my thanks are due for the opportunity of examining these collections, and who collected those specimens from SanJosé del Cabo and Hermosillo, Sonora. The remainder were collected by Mr. Chas. D. Haines, who deserves credit for the neat and careful way in which he has prepared his specimens. My thanks are also due Mr. Wm. H. Ashmead and Mr. Theo. Pergande, of

Washington, D. C., for determining the Parasitica and Formicidæ. (The latter will be found in a separate paper by Mr. Pergande.) I might state that several species of the smaller bees, which are evidently new, I have refrained from describing, as a lack of Mexican material renders their identification ambiguous.

TENTHREDINIDÆ.

Ptenus sp. El Paraiso, L. Cal. (*Haines*). May.

Nematus (?) sp. Same locality as the preceding.

ICHNEUMONIDÆ.

Enicospilus (Ophion) glabratus Say. Comondu (*Haines*) March, and San José del Cabo, L. Cal. (*Eisen*). 1 ♂ and 2 females.

Enicospilus (Ophion) purgatus Say. Margarita Island, L. Cal. (*Haines*). March. Two females.

Limneria sp. One ♀. San Quintin, L. Cal. (*Haines*). May.

Agrypon sp. San Julio, L. Cal. (*Haines*). April. One ♀.

Eiphosoma azteca Cress. One ♂. Comondu, L.

BRACON spp. Four species not identified, from several localities (*Haines*).

RHYSSALUS sp. One ♂. Margarita Island, L. Cal. (*Haines*). March.

CÆNOPHANES spp. Three species of this genus, not identified. El Paraiso (*Haines*). May.

RHOGAS ATRICEPS Cress. Margarita Island, L. Cal. (*Haines*). May.

APANTELES spp. Two species. Margarita Island and San Julio, L. Cal. (*Haines*).

AGATHIS sp. El Rosario, L. Cal. (*Haines*). May.

MICRODUS ANNULIPES (?) Cress. Magdalena Island, L. Cal. (*Haines*). March. Of this specimen Mr Ashmead writes: "I am not entirely satisfied the specimen named here as *Microdus annulipes* Cr. is really that species, although it agrees fairly well with the description, except that the second segment is usually black. It is probably a variety."

CRATOSPILA MEXICANA Ashm. n. sp.*

CHALCIDIDÆ.

CHALCURA CALIFORNICA Ashm. One ♀. Comondu, L. Cal. (*Haines*). March.

EURYTOMA spp. Two species of this genus. San Jorge and San José de Gracias (*Haines*). March and April.

SMICRA BIOCULATA Cress. One ♂. San Luis, L. Cal. (*Haines*). April.

TORYMUS sp. One ♀. No precise locality (*Haines*).

TORYMUS HAINESI Ashm. n. sp.†

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* The description of this species will be published later.

† The description of this species will be published later.

CHRYSIDIDÆ.

CHRYSIS SONORENSIS Cam. One specimen. San Esteban, L. Cal. (*Haines*). April.

CHRYSIS SELENIA Costa. Six specimens. San José del Cabo (*Eisen*) and Comondu, L. Cal. (*Haines*). March.

PARNOPES CHRYSOPRASINA Sm.

Although this species was described from North Carolina and to my knowledge has not been recorded from any other locality, I feel compelled to refer a specimen from San Borgia, L. Cal. (*Haines*) May, to it, as the specimen fits the description perfectly. It seems to me that Smith has probably given an erroneous locality for this species. Should this specimen prove not to be *chrysoprasina*, then it is a new species, as it is distinct from both *Edwardsii* and *fulvicornis*.

MUTILLIDÆ.

SPHÆROPHTHALMA ORCUS Cress. Five females. Santa Maria, L. Cal. (*Haines*) May; Hermosillo, Sonora (*Eisen*) April. The pubescence on abdomen of this species varies from fulvous to bright carmine.

related to *Sackenii*, from which it will be at once distinguished by the reddish body-color.

PHOTOPSIS CASTANEUS Cress. El Paraiso, L. Cal. (*Haines*) May.

PHOTOPSIS NEBULOSUS Bl. Five specimens. El Paraiso, May, and Calmalli Mines, L. Cal., April (*Haines*). These specimens are very large for this species.

PHOTOPSIS GLABRELLUS Cress. San José del Cabo, L. Cal. (*Eisen*). One specimen.

PHOTOPSIS INCONSPICUUS Bl. Margarita Island, L. Cal. (*Haines*). March. One specimen.

PHOTOPSIS spp. Two species, not identified. Comondu (March) and Calmalli Mines, L. Cal. (*Haines*).

PHOTOPSIS NOKOMIS Bl. Two specimens. San José del Cabo, L. Cal. (*Eisen*). The color of the abdomen in this species varies from dark " honey-yellow " to black.

PHOTOPSIS NIGRIVENTRIS n. sp.

♂.—Head scarcely as wide as the thorax, hind angles rounded; vertex with strong, sparse punctures, those on the front closer and not quite so strong; ocelli large and prominent; scape punctured; mandibles strongly punctured at base, which is produced outwardly into a strong angular lamina or tooth. Clypeus strongly depressed; thorax with coarse punctures, those on the prothorax, metapleuræ and scutellum more or less confluent and those on dorsulum sparsest; the metathorax covered with large foveæ or pits, the base with a strong ridge medially, extending about one-fourth the length of the metathorax, on each side of this ridge there is a somewhat oblique and shorter ridge; legs not at all spinose; abdomen fusiform, the first segment above with strong, separated punctures, beneath on same segment the punctures are stronger and confluent, dorsal segments 2–6 with fine punctures, which are sparsest on second segment, ventrally these segments are more strongly punctured, particularly on the second segment; wings subhyaline, stigma brown, nervures yellowish, with two submarginal cells (there is, however, faint traces of a third); head and thorax of a ferruginous brown, the antennæ, palpi, tegulæ and legs honey-yellow; abdomen, except first segment, which is colored like thorax, and the ocellar region, black; mandibles with long golden hair, the rest of the insect with long, rather dense, pale pubescence; segments of abdomen at apex with a fringe of short, white pubescence; the last dorsal segment with brown pubescence. Length, 16–18 mm.

Two specimens. San Josė del Cabo, L. Cal. (*Eisen*).

PHOTOPSIS BLAKEII n. sp.

♂.—Head scarcely as wide as the thorax, hind angles rounded; vertex with strong, sparse punctures, those on the front not much closer nor feebler; ocelli large and prominent, the hind pair situated in strong pits; scape punctured; outer margin of mandibles, with exception of a slight emargination in middle, entire; thorax with coarse sides of abdomen faintly blackish; the whole insect is clothed with a long, pale pubescence; segments of abdomen not fringed. Length, 16 mm.

Two specimens. San José del Cabo, L. Cal. (*Eisen*). In one specimen the ridges on metathorax are very short.

BRACHYCISTIS gen. nov.

General appearance of Photopsis. Width of the head variable. Eyes large rounded-ovate, their inner margin sinuous. Ocelli large, prominent, placed in the form of a triangle. Antennæ long, 13-jointed, situated very low down, its scape and pedicellum united shorter than first joint of flagellum. Mandibles strong, tridentate at apex. *Pronotum situated far below level of dorsulum, which is very strongly convex;* wings ample, *stigma large*, one *very short, truncate marginal*, which has a short appendiculation at apex; three submarginal cells, the second of which is usually triangular and sometimes petiolate, *recurrent nervures received by the second and third submarginal cells.* Legs not spinose, *the middle tibiæ with one spur*, their coxæ tolerably well separated. Tarsal claws curved, unarmed. Abdomen elongate, the form of the first segment varying from petiolate to sessile with the second segment, at the apex there is a single strong curved hook or spine, which projects beyond the seventh ventral segment and curves upward. Size variable, 6–15 mm. Type, *B. petiolatus* n. sp.

This genus, the ♂ only of which is known, as is likewise the case with several other allied genera, looks on first sight to be *Photopsis*, but the larger stigma, the recurrent nervures being received by second and third submarginal cells and the one-spurred middle tibæ, will at once distinguish it. The sculpture is much less strongly marked than in *Photopsis*, some species being very smooth and glabrous. Into this genus will fall the following species of *Photopsis:*

P. ampla Blake, *nitida* Cresson, *alcanor* Blake, *atrata* Blake, *sobrina* Blake, *lepida* Blake, *castanea* Cresson and *glabrella* Cress. and the following new species:

BRACHYCISTIS PETIOLATUS n. sp.

♂.—Black, the antennæ, mandibles, tegulæ and legs except coxæ and hind femora medially, pale-testaceous; the pro- and metathorax, first segment of abdomen, coxæ and hind femora medially, castaneus; the whole insect is sparsely clothed with long, pale-fuscous hairs; dorsulum indistinctly punctured, the mesopleuræ distinctly so; metathorax coarsely granulated or roughened, impressed medially, the sides smooth; wings hyaline, stigma pale testaceous, marginal cell very narrow, second submarginal cell with a long petiole; abdomen petiolate, the first segment or petiole thickened to the apex and is coarsely punctured. Length 7–8 mm.

Fourteen specimens, Calmalli Mines, L. Cal. (*Haines*). April.

SCOLIIDÆ.

POMPILIDÆ.

POMPILUS ÆTHIOPS Cress. Two female specimens. El Paraiso, L. Cal. (*Haines*). May.

POMPILUS TENEBROSUS Cress. San Jorge, L. Cal. (*Haines*). March. Two females.

PLANICEPS CONCOLOR Sm. Two females, which I refer doubtfully to this species, as they are much larger than the measurements given by Smith, although otherwise agreeing with the description. San Julio and Magdalena Island, L. Cal. (*Haines*). March and April.

MYGNIMIA MEXICANA Cress. San Julio, L. Cal. (*Haines*). April. One small female.

PEPSIS ORNATA Lep. San José del Cabo, L. Cal. (*Eisen*). One male.

PEPSIS RUBRA Drury. Ten females, five males. San José del Cabo (*Eisen*), and Calmalli Mines, L. Cal. (*Haines*), May; Hermosillo, Sonora (*Eisen*), April.

SPHECIDÆ.

SCELIPHRON LUCÆ Sauss. San José del Cabo, L. Cal. (*Eisen*). Three females, one male.

SCELIPHRON (*Chalybion*) CÆRULEUM Linné. San José del Cabo, L. Cal. (*Eisen*). One male.

SCELIPHRON (*Chalybion*) ZIMMERMANNI Dhlb. San José del Cabo, L. Cal. (*Eisen*). One female.

AMMOPHILA VARIPES Cress. Three females. San Quintin (May), San Esteban and Lower Purisima, L. Cal. (*Haines*). April. One male, San José del Cabo, L. Cal. (*Eisen*).

AMMOPHILA LUCTUOSA Sm. Two females. San Jorge, L. Cal. (*Haines*). March.

SPHEX CALIGINOSUS Er. One female. Hermosillo, Sonora (*Eisen*). April.

Sphex (*Isodontia*) elegans Sm. San José del Cabo, L. Cal. (*Eisen*). One female.

Trypoxylon sp.? A species related to *T. clavatum* Say, but the hind tarsi are entirely black. Calamujuet, L. Cal. (*Haines*). May.

Steniolia duplicata Prov. (=*scolopacca* Hdl.) San José del Cabo (*Eisen*), Magdalena Island, March, Lower Purisima and San José de Gracias, April (*Haines*). The size and markings seem to vary considerably in this species.

Monedula speciosa Cress. One male. El Paraiso, L. Cal. (*Haines*). May.

Monedula mammillata Handl.

I very doubtfully refer three male specimens from Lower Purisima, L. Cal. (*Haines*) April, to this species. While agreeing tolerably well with the description of *mammillata*, yet the markings on abdomen are different, and when the locality of *mammillata* (Georgia) is considered, I scarcely think these specimens are that species. For the present, however, I can do nothing more than refer them to it.

curved line, extending from side to side at apex of upper face of metathorax, large spot on metapleura which is emarginate above, legs entirely, including the coxæ, a broad fascia on abdominal segments 1–5, that on the first greatly narrowed medially, that on the second scarcely narrowed, but enclosing two transversely-ovate black spots, on third, fourth and fifth segments the fasciæ have two strong emarginations on anterior margin and a weaker one on posterior margin in the middle, sixth dorsal segment entirely and fasciæ on ventral segments which (the fasciæ) are more or less variable, all sulphur-yellow; wings clear hyaline, nervures brownish; antennæ rather long, reaching beyond the tegulæ, the first joint of flagellum fully as long as the second, third and half of the fourth united; clypeus and labrum indistinctly punctured; thorax microscopically punctured; posterior face of metathorax with a large triangular depression at top; tibiæ and tarsi strongly spinose; anterior tarsi with a well developed comb, the spines of which are shortest basally, the longest spines equal fully the length of the first joint; abdomen very finely shagreened. Length 21–23 mm.

♂.—Markings and coloration similar to the female, although the coxæ and trochanters are more or less black; antennæ scarcely reaching beyond tegulæ, joints 7–9 dentate beneath; legs armed as in the female; second ventral segment with a strong, longitudinal central keel, which is more prominent apically; sixth ventral with two approximate teeth, which, when viewed from the side, appear as one. Length, 20–21 mm.

Reno, Nevada (*Hillman*); California (coll. Am. Ent. Soc.), and San José del Cabo, L. Cal. (*Eisen*). Related to and closely resembles *B. nubilipennis* Cress., from which it usually can be distinguished by the hyaline wings;

however, the wings of *nubilipennis* are sometimes hyaline, so too much reliance must not be placed on that character. The greater length of the antennæ and longer tarsal comb will help in separating the females, while the form of armature on ventral segments two and six will distinguish the males.

BEMBEX LUCÆ Cress. El Paraiso and San Borgia, L. Cal. (*Haines*). May. This species seems to be undescribed, the name *Lucæ* being a manuscript one.

GORYTES EXIMIUS Prov. One female. El Paraiso, L. Cal. (*Haines*). May.

MASARIDÆ.

MASARIS MACULIFRONS n. sp.

♀.—Head and thorax with coarse, close punctures, having the appearance of being granulated, the punctures most distinct on the prothorax above and on the dorsulum anteriorly; abdomen with exceedingly fine and close punctures; marginal cell truncate at tip; deep black, subopaque; a large semi-oval spot on clypeus at base (the sides of the spot are emarginate), a pyriform spot just a short, erect pale-fuscous pubescence, wings subhyaline, fuscous in places, iridescent, stigma ferruginous, nervures black; tibiæ and tarsi more or less ferruginous. Length, 11 mm.

El Paraiso, L. Cal. (*Haines*). May. Related to *M. marginalis* Cresson, from which it may be distinguished by the spots on clypeus and scutellum, and by the coarse sculpture of head and thorax. From the other North American species, the white ornamentation will distinguish it.

EUMENIDÆ.

ODYNERUS TOLTECUS Sauss. Hermosillo, Sonora. April. (*Eisen*). One ♂ specimen.

ODYNERUS MYSTECUS Sauss. San José de Gracias, L. Cal. (*Haines*). April. Two specimens ♀ ♂. The ♀ differs from Saussure's description in having two "free spots" on second abdominal segment.

ODYNERUS sp. Two specimens of a species related to *mystecus*. Hermosillo, Sonora (*Eisen*). April.

ODYNERUS SAUSSUREI n. sp.

♀.—Clypeus pyriform, with a few coarse punctures, strongest towards middle; the clypeus has also some coarse, longitudinal folds or striæ, its anterior margin with two rather widely separated teeth; front with dense, coarse punctures, which gradually become weaker and sparser towards the vertex until they disappear entirely on the occiput, the latter with a slight depression in the middle; thorax as coarsely punctured as the front, but not so closely; lateral angles of pronotum not dentate; metathorax with its concave face, with a few irregular striations, which are most distinct on apical portion, the lateral angles rather sharp; first and second dorsal abdominal segments, with exception of the apical border of the second, impunctate; the remaining segments coarsely punctured, the second ventral sparsely so; black, a curved mark around base of clypeus; anterior margin of pronotum, two spots on each tegula, spot beneath base of wing and the postscutellum, whitish; apical margins of first and second dorsal and second ventral segment, also whitish, that on second ventral interrupted medially; wings, with exception of the marginal and median cells, which are fuscous, hyaline, nervures and stigma black; legs entirely black. Length, 12 mm.

San José del Cabo, L. Cal. (*Eisen*). Related to *Megæra*, *foraminatus* and *leucomelas*, but is very distinct from all three.

VESPIDÆ.

POLISTES CARNIFEX Sauss. A variety of this species. San José del Cabo, L. Cal. (*Eisen*). Two specimens.

POLISTES BELLICOSA Cress. El Paraiso, L. Cal. (*Haines*). May. One specimen. There are in the collection three other species of this genus, which at present I am unable to identify.

APIDÆ.

Panurgus halictoides n. sp.

♀.—Head and thorax coppery-green, the abdomen testaceous; front and clypeus finely and closely punctured, clothed sparsely with white pubescence; mandibles ferruginous, darker at tips; flagellum beneath testaceous; the cheeks with white pubescence; punctuation of the dorsulum more distinct than that of the front; upper surface of metathorax depressed and covered with strong, somewhat irregular radiating ridges; the posterior face of metathorax finely punctured; the whole thorax is more or less covered with pale pubescence, which is shortest and sparsest on dorsulum and scutellum and longest on the mesopleuræ; legs and abdomen testaceous, more or less clothed with the usual pale pubescence, the apical segment of the abdomen has the pubescence somewhat fuscous; tegulæ testaceous; wings hyaline, iridescent, nervures and stigma brownish. Length 4 mm.

One specimen. San José de Gracias, L. Cal. (*Haines*). April. This species resembles greatly some of the smaller green species of *Halictus*, but can be distinguished from them by possessing but two submarginal cells.

Calliopsis sp. San Julio, L. Cal. (*Haines*). One specimen, evidently a new species.

Calliopsis margaritensis n. sp.

♀.—Deep shining black, sparsely clothed with whitish pubescence; clypeus with large, deep and separated punctures and is tolerably well produced anteriorly; mandibles reddish at tips; front and face with fine punctures, those on the face sparse, while those between the antennæ and ocelli are compact, the punctures also sparse on the vertex; flagellum beneath testaceous; dorsulum with fine, indistinct punctures, shining; scutellum likewise and not impressed; metathorax above at base with a rather narrow transverse, curved, depression, which is rugose within; tegulæ testaceous; wings subhyaline, strongly iridescent, nervures and stigma brownish, second submarginal cell if anything narrowed a little less than one-half at the top; tarsi apically testaceous, their pubescence slightly brownish; abdomen with the apical margins of the segments, particularly the dorsal ones, testaceous, the last segment with subfuscous pubescence; the ventral segments are rather strongly punctured. Length, 5–5½ mm.

Four specimens. Margarita Island, L. Cal. (*Haines*). March. Resembles very much our *ornatipes* and *albitarsis*, but the dorsulum is much more finely punctured than in either.

PERDITA sp. One specimen. Calmalli Mines, L. Cal. (*Haines*). April.

PERDITA SPARSA n. sp.

♀.—Head and thorax light metallic green, clothed with pale pubescence; clypeus in the middle, glabrous, im-line, iridescent, nervures pale-fuscous, the stigma in the middle pale; abdomen testaceous, the first segment above with two small lateral spots, the second basally with a transverse band, which is narrowed medially, the third and fourth segments with a somewhat similar band, except that it is not so narrow and is interrupted medially, all yellow, the apical segments clothed with pale pubescence, the last segment reddish. Length, 7 mm.

Var. ♀.—The greater part of clypeus, sides of face, labrum, mandibles and anterior tarsi yellow; the two spots on first abdominal segment coalesce and form a narrow and sinuous band, the band on second segment not narrowed medially.

♂.—Much smaller than the ♀; labrum, mandibles, sides of face, spot between antennæ, scape and greater part of flagellum entirely, yellow; the head very finely and closely punctured; thorax more finely and closely punctured than in the female; the metathorax also finely punctured; bands on the abdomen narrower and are all interrupted medially; the apex of all the femora are yellowish. Length, 5 mm.

Two ♀ and one ♂. Margarita and Magdalena Islands (*Haines*). March. Related to *albipennis* and *zonalis*, from which it differs by the sparse punctuation of the front, etc. The ♂ may be distinguished from that of *8-maculata* by the paler green of the head and thorax, and by the almost entirely yellow color of the antennæ.

PERDITA VENTRALIS n. sp.

♀.—Head and thorax dark metallic green, sparsely clothed with pale pubescence; face and clypeus with fine, close punctures, the punctures becoming finer on the front and vertex; labrum with a pit or depression at base; the cheeks at the bottom are armed with a strong, blunt tooth; frontal impressed line scarcely distinct; mandibles, except tips, labrum, clypeus, a spot beneath the insertion of each antennæ, and the antennæ beneath, yellow; the latter above testaceous; dorsulum and scutellum glabrous, seemingly impunctate; metathorax at extreme base transversely roughened; tegulæ and greater part of four anterior legs yellow, the hind legs testaceous; wings hyaline, iridescent, the nervures and stigma fuscous-white; abdomen testaceous, with an irregular band on segments 2–5, which is emarginate posteriorly; ventrally the abdomen is entirely yellow, in some specimens stained with testaceous at base and apex; the apical segments are sparsely clothed with pale pubescence. Length, 4 mm.

Three specimens. Margarita Island, L. Cal. (*Haines*). March. The entirely yellow ventral segments of the abdomen will distinguish this species.

Perdita arcuata n. sp.

♂.—Head and thorax dark metallic green, sparsely clothed with pale pubescence; clypeus with rather fine, not very close punctures, its anterior margin strongly and widely arcuated; antennæ separated by a rather strong ridge, which extends from base of clypeus almost to

Epeolus occidentalis Cr. Two ♀ and one ♂ specimens. Margarita Island, L. Cal. (*Haines*). March.

Ericrocis rugosa n. sp.

♂.—Labrum rounded anteriorly, coarsely rugose; upper part of front and the vertex with distinct, but not deep, separated punctures; ocelli forming almost a straight line; antennæ not reaching the apex of the tegulæ, the flagellum scarcely narrowed to the apex, joint one of flagellum a little shorter than the second, which is a little longer than the third, joints 3–9 are about equal in length, the last joint longest; dorsulum and scutellum sub-opaque, impunctate, the scutellum strongly bituberculate, the tubercles round and not dentate; legs robust, particularly the hind pair; fourth ventral abdominal segment with its apical margin somewhat reflexed. Black, the flagellum beneath reddish-brown; front, clypeus, thorax on the sides and on the dorsulum anteriorly, three small patches on the scutellum and dorsulum, abdominal segments 1–5 with a large transverse patch on each side, either a dirty yellowish-white or tawny*, the abdominal patches are on the first segment ovate, on the second segment much narrowed medially, and broadened on outer end, as are likewise those remaining; on the thorax beneath the pubescence is whitish; legs brownish, black in spots, the tibiæ at base on outer side with a patch of pale pubescence; wings sub-hyaline, the apical portion, including a part of the marginal cell, stained with brownish, nervures ferruginous; tegulæ and the apical margins of the abdominal segments testaceous. Length, 12 mm.

Santa Maria, L. Cal. (*Haines*). May.

Heriades sp. San Luis, L. Cal. (*Haines*). April.

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* The specimen having been in alcohol, leaves me in some doubt as to the original color of the pubescence.

ANTHIDIUM CALIFORNICUM Cress. San Esteban, L. Cal. (*Haines*). April. Differs from the typical form in having the pubescence on thorax pale and by lacking the yellow markings on legs.

LITHURGUS OBLONGUS n. sp.

♀.—Labrum about as long as the mandibles, broadest basally, coarsely and sparsely punctured, and just before the apex bears a very strong, transverse ridge (in shape the labrum is somewhat oblong); mandibles with coarse punctures, much contracted on inner side at about the middle, the apex tridentate; clypeus produced into a broad flap-like projection, the fore margin of which is broadly emarginate, its upper surface very coarsely punctured and strongly furrowed down the middle; between insertion of antennæ there is a strong convexity; front and vertex strongly and evenly punctured, the front more strongly so; ocelli forming a curve, placed in pits; on the vertex extending back a short distance, and dividing the hind ocelli there is a strong impression; dorsulum and scutellum punctured about like the front; first abdominal segment, the basal portion of segments 2–5, and the

MEGACHILE POLLICARIS Cress. One female. El Paraiso, L. Cal. (*Haines*). May.

MEGACHILE EXILIS Cress. One male. San Ignacio, L. Cal. (*Haines*). April.

CERATINA sp. Evidently a new species. Margarita Island, L. Cal. (*Haines*). March.

MELISSODES SUFFUSA Cr. One female. San José del Cabo, L. Cal. (*Eisen*). There are in the collection four other species of this genus, which I have been unable to identify.

DIADASIA APACHA Cress. *Melissodes apacha* Cr. Proc. Acad. Nat. Sci. Phila., 1878, p. 217. Five specimens. San Julio, San Esteban and San José de Gracias (April), El Paraiso (May). All collected by Haines.

DIADASIA ENAVATA Cress. One male. Comondu, L. Cal. (*Haines*). March.

DIADASIA DIMINUTA Cress. One male. San José de Gracias, L. Cal. (*Haines*). April.

ANTHOPHORA MACULIFRONS Cress. One female. San José del Cabo, L. Cal. (*Eisen*).

ANTHOPHORA sp. San Esteban, L. Cal. (*Haines*). April. A species closely allied to *A. urbana* Cress.

ANTHOPHORA sp. San José del Cabo, L. Cal. (*Eisen*). Occurs also in California proper. A small species related to *A. exigua* Cr.

XYLOCOPA ARIZONENSIS Cress. Comondu (March), El Rancho Viejo (April) and El Paraiso (April and May). Collected by Haines. Six females.

XYLOCOPA ORPIFEX Sm. Comondu (March), El Paraiso (May). Collected by Haines. Seven females, one male.

XYLOCOPA sp. A large black species, which may be the *aenipennis* DeG. San José del Cabo, L. Cal. (*Eisen*). Twenty females, nineteen males.

XYLOCOPA VARIPUNCTATA Patt. Five females, two males. This species is closely allied to the West Indian *X. cubæcola*, but is larger, the vertex is more closely punctured and the wings of the female are darker. The ♂ is as in *cubæcola* entirely fulvous. San José del Cabo (*Eisen*) and Comondu (*Haines*), March.

CENTRIS LANOSA Cress. San José del Cabo (*Eisen*), Calmalli Mines, April and Calamujuet, May (*Haines*), and Hermosillo, Sonora (*Eisen*) April. This species is very likely identical with *C. mexicana* Sm.

CENTRIS sp. A male specimen from San José del Cabo, L. Cal. (*Eisen*), which is evidently a new species, but unfortunately is too poor for describing, having been in alcohol. The whole insect is covered with a dense ashy-grey pubescence.

CENTRIS EISENII n. sp.

♀.—Black; a transverse mark on anterior part of clypeus, from the middle of which there extends a line fourth and fifth segments with a broad, bright yellow band; ventrally the abdomen on the sides is fulvous, the middle part black, segments two to five with a fringe of long, white pubescence; wings sub-hyaline, nervures and stigma black; clypeus strongly and sparsely punctured; labrum densely clothed with pale pubescence, which is longest anteriorly. Length, 16–20 mm.

Guaymas, Mex. (*Eisen*). May. Resembles very much and is related to *Centris fasciata* Smith, from Jamaica, but is distinct in having the pygidium larger, the pubescence on thorax darker and the scape is entirely black.

BOMBUS CALIFORNICUS Sm. El Rosario, L. Cal. (*Haines*). May. Two specimens.

BOMBUS SONORENSIS Say. San José del Cabo (*Eisen*) and Comondu (*Haines*), L. Cal. March. Seven females and six neuters.

APIS MELLIFICA Linn. San José del Cabo (*Eisen*). Calamujuet, San Borgia and El Paraiso, L. Cal. (*Haines*). May. Numerous specimens.

ADDITIONAL SPECIES.

Since compiling the preceding paper Mr. Eisen has sent me a small collection from San José del Cabo, which contains the following additional species:

NOTOGONIA ARGENTATA Bve. (=*Larra argentata* Bve). One ♂ specimen.

POMPILUS CONNEXUS n. sp.

♀.—Head and thorax black; abdomen dark ferruginous; head, thorax and legs covered with a plumbeous or cinereus pile, except the vertex, dorsulum and scutellum, the pronotum above also lacks this pile medially, the pile on its posterior margin connected with that on its anterior portion by a narrow central line of pile; wings blue-black, third submarginal cell not at all petiolate, with a distinct radial or marginal side, and receives the second recurrent nervure at about the middle; flagellum of antennæ not pilose, its first joint about as long as the second and two-thirds of the third; clypeus slightly incurved medially; posterior margin of pronotum bowed (in one specimen slightly sub-angular); metathorax with a slightly impressed line; tibiæ and tarsi armed with stout spines; claws armed with an acute tooth near the base; comb on fore tarsi composed of long and stout spines, which are nearly as long as the first joint; longer spur of hind tibiæ equal to about half the length of the first hind tarsal joint; abdomen much longer than head and thorax united, apically with a few black hairs. Length, 14–16 mm.

San José del Cabo, L. Cal. (*Eisen*). Two specimens. Evidently related to *P. apiculatus* Smith, from Vera Cruz.

AGAPOSTEMON NASUTUS Sm. Three specimens.

CENTRIS MUSTELINA n. sp.

♀.—Head and thorax black, the abdomen and legs tawny, mandibles at base and apex yellow; clypeus, la-the clypeus and labrum is yellowish; pubescence on legs very short when compared to the other sex; sixth dorsal abdominal segment armed with a large tooth on each extreme side, the seventh dorsal large, subquadrate, its sides contracted, and with two strong, widely separated and slightly converging ridges, which extend from the base to near apex, the latter is slightly reflexed and black, the last ventral segment is depressed on each side, the depressions bounded outwardly by an oblique ridge, near the apex of this segment there are two widely separated tubercles, which are sometimes connected with the oblique ridges which margin the lateral depressions. Length, 18 mm.

San José del Cabo, L. Cal. (*Eisen*). One ♀ and eight ♂ specimens.

EXOMALOPSIS PULCHELLA Cress. One female specimen, that seems to be this West Indian species.

ON A COLLECTION OF FORMICIDÆ FROM LOWER CALIFORNIA AND SONORA, MEXICO.

BY THEO. PERGANDE.

The determination and description of Formicidæ can only be accomplished in a satisfactory way if large series of specimens, taken from the colonies, are available for examination and comparison. It was with some reluctance, therefore, that I have undertaken the task of determining the small collection of ants which was brought together by Mr. Gustav Eisen and Mr. Chas. D. Haines of San Francisco, Cal. If I have ventured to describe some of the species as new, it has been done after a thorough study of the literature on the subject and after a careful comparison with the material at my command.

FORMICIDÆ.

1. CAMPONOTUS MACULATUS Fab., race OCREATUS Em.

One ☿ major, one ☿ minor. San Luis and San Esteban.

This race is found as far north as the Panamint Mountains, Cal.

median and posterior femora. A few shorter and stiffer hairs may also be observed at the apex of the femora. Appressed pubescence minute, intermixed on the scape with fine, erect hairs. Head about one-third broader than the thorax, broadest at posterior angles and gently decreasing in width towards the mandibles, emarginate behind, with the posterior angles rounded. Clypeus truncate in front, its median carina distinct. Surface of head and thorax densely and finely granulated and sparsely punctured. Abdomen with a still finer sculpture and somewhat transversely striated. Mandibles smooth, with scattered piliferous punctures; their apical edge with six black teeth. Antennæ slender, the scape reaching a little beyond the posterior angles of the head. Scale ovoid, broadest beyond the middle, stoutest at base, slightly arcuate in front, almost straight behind. Legs long and slender.

☿ minor: Length, 5–7 mm. General color somewhat paler than in the ☿ major, the head and thorax without darker shadings, the abdomen either faintly brownish or only the sutures somewhat darker. Median and posterior femora almost white. Head about twice as long as broad, scarcely broader than the thorax; its sides parallel, rounded beyond the eyes. Antennæ longer and more slender, the scape reaching nearly to the mesothorax.

It is a very delicate looking species.

The ☿ minor resembles very much that of *Camp. melleus* Say, though it is smaller, more delicate, with the head not emarginate. *Camp. melleus* differs from it also in the absence of erect hairs on the scape and in the stouter scale.

This species resembles also somewhat *Camp. atlantis* Forel, differing from it however in the form of the clypeus, which, in that species, is narrower and considerably extended beyond the insertion of the mandibles.

Many specimens. Taken at San José del Cabo and at San Fernando.

3. **CAMPONOTUS FUMIDUS** Rog.

Camp. fumidus Rog., Berl. Ent. Zeitsch., vii, p. 151.

One ☿. San Julio.

4. **CAMPONOTUS MARGINATUS** Ltr., var.

Formica marginata Ltr., Hist. Fourm., p. 103.
Camponotus marginatus Rog., Berl. Ent. Zts., 1862, p. 292.
Formica fallax Nyl., Form. Fr., p. 57.
Camponotus fallax Mayr, Europ. Form., p. 56.
Formica discolor Buckley, Pr. Ent. Soc. Phil., 1866, p. 166.
Formica San Sabeana, Buckley, *ibid.*, p. 167.

One ☿. San Julio.

This variety is black and polished, with the scape of the antennæ and the legs dark brownish.

Similar forms are found at Washington, D. C., and in Florida. This form differs from them, however, in having a distinct constriction or suture between the meso- and metanotum and in the shape of the scale. It may possibly represent a new species, though I am not pretennæ and those on the mandibles, short and stiff. Pubescence of the legs still shorter and more or less appressed, excepting a few longer and erect hairs at the knees; a few longer hairs may also be observed on the scape of the antennæ.

Head of ☿ major about one-half broader than the thorax, though but slightly broader in the ☿ minor; slightly longer than wide, somewhat broadest behind; its sides above insertion of the antennæ almost parallel, gently curving towards the mandibles, distinctly emarginate behind in the ☿ major, but almost straight in the ☿ minor. Clypeus straight or but faintly emarginate in front; its median carina rather indistinct. Frontal area minute, triangular. Eyes ovoid and considerably above the middle of the face, their upper edge almost in a line with the upper angles of the frontal carinæ; those of the ☿ minor almost lateral. Antennæ of the ☿ major rather stout, the scape scarcely reaching beyond posterior angles of the head, more slender and longer in the ☿ minor. Mandibles with five or six teeth, their basal half or more finely striated, the rest smooth and with scattered piliferous punctures. Head and thorax finely and densely granulated, with coarse punctures between the frontal carinæ and short, radiating, linear depressions on the vertex of the ☿ major. Prothorax somewhat flattened above.

Scale stout, broadest and truncate at apex, with the hind angles rounded; of equal thickness from base to about two-thirds its length; apical third inclining backward; the posterior face perpendicular. Abdomen with dense and fine transverse striæ and scattered piliferous punctures.

This species appears to be related to *Camp. novogranadensis* Mayr, from which it differs, however, in its flattened and more angular prothorax, the stouter scale, finer pubescence and in the coloration of antennæ and legs.

Described from many specimens, taken at San Esteban, San Jorge, El Paraiso, San Julio, San José de Gracias and San José del Cabo.

6. MYRMECOCYSTUS MEXICANUS Wesm.

Myrmecocystus mexicanus Wesm., Bull. Ac. r. sc. et bell. lett. Brux., v, 1838, p. 770.

One ☿. Santa Maria.

7. DORYMYRMEX PYRAMICUS Rog.

Prenolepis pyramicus Rog., Berl. Ent. Zts., 1863, p. 160.
Formica insana Buckley, Proc. Ent. Soc. Phila., 1866, p. 165.
Dorymyrmex insanus McCook and var. *flavus* McCook, Cotton Ins., 1879, pp. 185 and 186.

Two ☿ ☿. Magdalena Island.

Differs from the typical form only in the entirely black antennæ and legs.

8. TAPINOMA SESSILE Say, var.

Formica sessile Say, Boston Journ. N. H. S., I, p. 287.
Tapinoma boreale Rog., Berl. Ent. Zts., 1863, p. 165.
Tapinoma boreale Mayr, Myrm. Beitr., Sitzb. d. k. Acad. d. Wissensch., liii, 1866.

MYRMICIDÆ.

9. PSEUDOMYRMA sp.

One ☿. Calmalli mines.

This may be but a variety of *Pseudomyrma thoracica* Nort., though the specimen is only about half the size. The principal difference appears to be its coloration. Sufficient additional material would be needed to settle the question of identity.

10. ATTA VERSICOLOR n. sp.

☿. Length, about 6 mm. Color reddish-brown. Eyes and apical edge of mandibles, black. All depressions and all prominences appear to be black in a certain light, while the nodes and the abdomen, if viewed from above or in certain directions from the side, have a bright coppery reflection.

Head wider than long, deep and angularly emarginate behind; a rather broad, shallow frontal channel and laterally carinated area beyond insertion of antennæ. Posterior angles of head rounded and with a row of six or more short denticles, the last one somewhat longest; three or more teeth may also be observed along the posterior ventral edge each side, the anterior one of which being longest. Frontal laminæ broad, somewhat longer than wide, bifid at upper angle; interno-ocular carinæ distinct, curved inwards. Clypeus broadly triangular, slightly arcuate in front, with a slight median emargination. Mandibles large, triangular, their apical edge almost straight and furnished with four to six blunt, rudimentary teeth. Scape of antennæ rather short, reaching but little beyond posterior angles of the head. Thorax of the usual shape in this genus.

Prothorax with two stout spines each side, the anterior pair farthest apart, longest, inclining forward, the other two stouter, directed backward and outward; two short, stout, backward directed median tubercles or spines in front of the middle of the mesothorax and a still shorter one each side of them at the anterior margin. Metathorax with a deep median depression, the upper edges quite acute, terminating anteriorly in a small tooth-like projection. Metathoracic spines rather long and slender, curved backward and outward.

First node of petiole triangular from a lateral view, its two dorsal and the lateral faces quite flat, the edges acute; the upper edges are provided anteriorly with two short, stout teeth, and laterally with two to three smaller denticles each side; there is also a forward directed, acute ventral tooth at base. Second node wider than long, rounded in front and at sides, truncate behind, concave above, the edges acute and beset with four or five short, acute teeth; there is also a prominent lateral carina, furnished with four or five teeth, and two ventral teeth.

Abdomen of the normal shape, the first segment with a depressed median line, and each lateral half with about twenty-five teeth, some of them bifid, arranged in irregular rows. The other segments without teeth or tubercles.

Head, pro- and mesothorax rugoso-granulate; the

11. POGONOMYRMEX BADIUS Ltr.

Formica badia Ltr., Hist. Fourm., p. 238.
Myrmica californica Buckley, Proc. Ent. Soc. Phila., 1867, p. 336.
Pogonomyrmex badius Mayr, Verh. d. k. k. zool.-bot. Gesellsch., 1870, p. 971.

One ☿. San Fernando.

12. POGONOMYRMEX BADIUS Ltr., var. ESTEBANIUS n. var.

♀. Length, about 9 mm. Color yellowish-red, the abdomen darker; the first segment with broad, blackish apical and lateral margins. Eyes black. General sculpture nearly identical with that of the typical form, but slightly stronger on the declivity of the metanotum and nodes. The first node is also somewhat larger, its sides more parallel, and the apex of the hump not so acute; while the stigma is black instead of being yellow.

☿. Length, 6–7 mm. Color darker red than in the typical form; the apical third, or more, of the abdomen more or less blackish, and the nodes often brown; the petiole is more slender and the first node longer and less erect; the apex rounded or sometimes but slightly pointed.

Two ♀ ♀ and many ☿ ☿. Calmalli Mines, San Esteban.

A few specimens from Margarita Island and San Borgia have the entire abdomen and the first node black, or very dark brown, while the second node is generally either brown or reddish and only occasionally black.

13. APHÆNOGASTER PERGANDEI Mayr.

Aphænogaster Pergandei Mayr, Verh. d. k. k. zool.-bot. Gesellsch., 1886, p. 448.

Twenty ☿ ☿. San Borgia and Calamujuet.

This species has been found as far north as San Bernardino Co., Cal.

14. APHÆNOGASTER SONORÆ n. sp.

☿. Length, 7–9 mm. Reddish-brown; declivity of metathorax, inner face of its thorns and more or less of base of first abdominal segment reddish. Eyes blackish-brown. The whole insect is highly polished and rather sparsely beset with medium sized, erect, pale and glistening, stiff hairs, which are densest on the head and ventral side of the abdomen, longest and finer on the under side of the head, the coxæ and ventral side of abdomen; those on under side of head are longest and gently curved forward, similar to those of *Pogonomyrmex*. Pubescence of antennæ shortest and somewhat appressed.

Head almost twice as long as broad, slightly broadest at insertion of mandibles, gently rounded beyond the eyes, with the posterior emargination almost semicircular, and about as broad as the prothorax. Its surface is densely and finely striated, the striæ extending but little beyond the eyes, except those along the middle of the face, which extend a little farther back, their ends curving inward and becoming confluent. Spaces between the striæ dense but finely granulated. Lower portions of cheeks and the vertex beyond the striæ polished and

Thorax much elongated, almost twice as long as the head, the divisions but feebly indicated. Prothorax and dorsum of mesothorax polished and delicately shagreened; the metathorax and sides of the mesothorax with dense, transverse striæ; the posterior declivity and thorns of the metathorax smooth and polished, the thorns with longitudinal striæ at base. Thorns large, gently curved, inclining backward. Nodes of the petiole polished, faintly shagreened, each with two longitudinal, impressed lines above; the highest point of the first node slightly inclining forward; second node pyriform, stoutest posteriorly. Abdomen highly polished, with scattered piliferous punctures, those of the first segment prolonged posteriorly in a depressed line of the length of the hairs. Legs long, slender and highly polished, the hairs denser and shorter than on the rest of the body.

Four ☿ ☿. Hermosillo, Sonora.

This may possibly be but a variety of *Aph. albisetosa* Mayr, from the description of which it appears to differ in the shape and sculpture of the thorax.

15. SOLENOPSIS GEMINATA Fab.

Atta geminates Fab., Syst. Piez., p. 423.
Myrmica paleata Lund, Ann. Sc. Nat., 1831, p. 116.
Solenopsis mandibularis Westw., Ann. Mag. N. H., vi, 1841. p. 87.
Myrmica Gayi Spin., Hist. Chile, vi, 1851.
Myrmica virulens Sm., Cat. Brit. Mus., 1858, p. 132.
Atta clypeata Sm., Cat. Brit. Mus., 1858, p. 169.
Myrmica sævissima Sm., Tr. Ent. Soc. Lond., n. s., iii, 1855, p. 166.
Solenopsis cephalotes Sm., J. Proc. Linn. Soc., iii, 1859, p. 149.
Cremastogaster laboriosus Sm., J. Proc. Linn. Soc., v, suppl., 1861, p. 109.
Diplorhoptrum Drewseni Mayr, Europ. Form., 1861, p. 73.
Myrmica glaber and *polita* Sm., Trans. Ent. Soc., 3d Ser., 1862, p. 34.
Atta coloradensis Buckley, Proc. Ent. Soc. Phila., vi, 1866, p. 346.
Solenopsis xyloni McCook, Rep. on Cotton Ins., 1879., p. 188.

Four ☿ ☿ major, three ☿ ☿ minor. Comondu and Patrocinio.

The varieties of this species are almost as numerous as its synonyms. Very common in the West Indies, Florida, Alabama, Louisiana, Texas, California, Mexico, Central and South America.

16. CREMASTOGASTER LINEOLATA Say.

Myrmica lineolata Say., Boston Jour. Nat. Hist., i, 1837, p. 290.

Cremastogaster lineolata Mayr, Verh. d. k. k. zool.-bot. Gesellsch., 1866, p. 901.

Myrmica novæboracensis Buckley, Proc. Ent. Soc. Phila., 1866, p. 337.

Myrmica (Monomorium) marylandica Buckley, *ibid.*, p. 339.

Myrmica (Monomorium) columbiana Buckley, *ibid.*, p. 340.

Œcodoma (Atta) arborea Buckley, *ibid.*, p. 349.

Cremastogaster coarctata Mayr, Neue Formiciden, 1870, p. 992.

Cremastogaster lineolata McCook, Cotton Ins., 1879, p. 187.

Cremastogaster lineolata Mayr, Verh. d. k. k. zool.-bot. Gesellsch., 1886, p. 462.

Five ☿ ☿. San Jorge, San José de Gracias, San Ignacio.

This species is represented in North America by numerous forms, some of which, after careful study of long series of colonies from different parts of the country, may at least be entitled to variety names.

TUNICATA OF THE PACIFIC COAST OF NORTH AMERICA. I.—PEROPHORA ANNECTENS N. SP.

BY WILLIAM E. RITTER.

While the summer work in biology of the University of California was being carried on at Pacific Grove, during the month of July, 1892, my special attention was given to the Tunicates of that locality. All the rocky shores of Monterey Bay, particularly those of the southern, or Monterey side, are very rich in this group of animals.

A large collection was made by myself and students, and the paper here presented is a portion of the results of the study begun on the living animals at the seaside, and continued on preserved material brought back to Berkeley. In my efforts to reach conclusions concerning the variations that were early found to be conspicuous in the form under observation, I have been able to compare a larger number of individuals than would have been possible but for the assistance rendered me by one of my students, Mr. S. J. Holmes, who has prepared many specimens for examination. I may here say, however, that although I have examined many hundreds of individuals, and with considerable detail, as far as general anatomy is concerned, I am satisfied that I have not pursued the subject to the extent that it deserves. I anticipate that further study along this line will yield interesting results.

The species in hand is a Perophora, as I believe the sequel will show to the satisfaction of every one acquainted with this genus and its nearest congeners. But the interesting fact may be pointed out at once that the characteristic of chief importance for distinguishing it from the other species of the same genus, would, according to some of the schemes of tunicate classification recognized at present, place it in a different family from that to which the genus Perophora is assigned; or, by other schemes, in a different suborder. The character to which I refer is this: *In very many, though not all, of the colonies the ascediozooids are as completely imbedded in a common test as they are in Botryllus or Goodsiria.*

The distinction between "simple" and "compound," as applied to Ascidians, the importance of which has diminished in the same ratio that our knowledge of the group has increased, is reduced to *nil* by the discovery of this form, so far as its value in determining affinities is concerned.

Down to Savigny's time ('16) the compound Tunicates had not been distinctly recognized as Tunicates, but had been generally regarded as Alcyonaria. This author made clear their true nature, and grouped them together under the name *Téthys composées*, as opposed to the *Téthys simples.**

After this Lister ('34) made the first of the long series of discoveries that has finally resulted in establishing a recognized its intermediate position between the simple and compound Ascidians, because of its power of reproducing by budding, and in conclusion he says: "Je proposerai aussi de donner à ce groupe intermédaire le nom de: SECTION DES ASCIDIES SOCIALES" (p. 266). And in this new section he placed also the one species of Perophora then known. The two divisions of Savigny were retained, with simply the substitution of the name "Ascidies" for "Téthys."

These three co-ordinate sections, thus established by Milne-Edwards, were recognized by many writers, and not particularly opposed by any, until Herdman's ('80) preliminary report on the Tunicates collected by the Challenger Expedition was made. In this collection this author discovered a new genus, belonging to the same family as Clavelina, named by him Ecteinascidia, which differs from Ciona, a genus of simple Ascidians, chiefly in the fact that it reproduces by budding. But he affirms that both Ciona and Ascidia are sometimes found to possess stolons ('82, p. 238). He concluded that the transition between the "*Ascidies simples*" and the "*Ascidies sociales*" of Milne-Edwards is so complete that the latter can no longer be regarded as a natural group. He therefore discarded it and united all the genera included in it (Herdman, '91, p. 599*, and Garstang, '91, pp. 50, 57 and 62), in one family, the Clavelinidæ of the Ascidiæ Simplices.

Finally, Garstang ('91, pp. 48 and 49) declares it as his belief that "the division of the Ascidiacea into the sub-orders *Ascidiæ simplices*, *Ascidiæ compositæ* and *Ascidiæ*

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* The conjecture here made by Prof. Herdman, that *Clavelinopsis rubra* Fewkes, from the California coast, does not belong to the Clavelinidæ, is correct. It is not a *Boltenia*, however, but a *Styela*, probably an undescribed species, though I have not yet studied it with sufficient care to say with certainty.

salpiformes, so completely disregards the admitted interrelationships between various sections of these groups, that its adoption seems to me to involve the rejection of any morphological, and therefore genetic, meaning in classification altogether." This author, therefore, drops these three suborders entirely, and simply groups the genera together into families.

As already said, incidentally, the first Perophora was described by Lister ('34). He did not name it, however, this having been done by Wiegmann ('35), who established the genus for it and designated it specifically by the name of its discoverer.

Since that time, three more undoubted species, including the one that is the subject of the present paper, have been added to the genus.

The first of these three, *P. Hutchinsoni*, from Australia, was described by Macdonald ('59). The second, from the New England coast of North America, was described by Verrill ('71). This is *P. viridis*.

In recognition of the interesting transitional character of the one here made known, I propose for it *annectens* as a specific name.

Apertures both terminal, branchial six lobed, atrial five or six lobed (though the number of lobes is not constant for either orifice). A variable number of yellow pigment spots on the lobes of the branchial opening.

Tentacles about twelve in number (frequently more), of different lengths, irregularly scattered on the inner surface of the branchial siphon. Irregular in arrangement.

Branchial Apparatus. Stigmata in four circles, about eighteen in each half circle. *Horizontal membranes* present. *Internal papillæ* conspicuous, each consisting of a post-like connecting bar, from near the inner end of which project two processes, the one anterior, the other posterior. *Dorsal languets* three in number, one for each transverse vessel. Each turned to the right side.

Duct of the neural gland is funnel-shaped, opening to the right of the median line.

Genitalia situated in the loop of the digestive tube, the testes exceedingly variable as to the number of its lobes, from one to eight having been observed in different individuals.

I. GENERAL DESCRIPTION.

As thus defined, the species is not certainly known to exist elsewhere than in Monterey Bay. I have collected Perophora at Point Reyes, north of San Francisco Bay, and at Santa Catalina Island, off the coast of Southern California. But at neither of these points, nor elsewhere on our coast, though I have searched quite carefully at several places, have I found the compounded form. In addition to the difference in this regard, there are certain other differences, greater or less in different colonies, and apparently different localities, that may be sufficient in extent and constancy to make it worth while to recognize other species than the one now described.

I leave the question as to what shall be done with the Perophora of our coast that can hardly, in the present state of our knowledge, be included in the new species, as I have defined it, because it seems to me wiser to tentatively leave a partially known group without a name, pending further investigation, than to tentatively name such a group, as is the practice of systematists in some quarters, with a large probability that the literature of the subject will thereby be permanently befogged for future students.

At extreme low tide, the species is abundant at Pacific Grove, though rather less so than numerous other species of compound Tunicates with which it is associated. It grows upon rocks, sea weeds, larger sertularian hydroids and other common objects of the shore, but particularly on another Tunicate, a large, undetermined species of Clavelina, that is common here. To what depths it extends I do not know. None have been taken by the dredge, for our dredging at Monterey was confined to sandy bottoms where the Perophora would not be likely to occur to any considerable extent.

The colonies in which the ascidiozooids are most completely embedded in the common testicular mass and are most crowded, are found on such objects as present a rather even surface, over which they may spread. Thus in many instances the large individuals, an inch and more in length, of the Clavelina, already mentioned, are found dition here shown is quite characteristic. At the extreme edge of the colony there is a narrow, irregular belt of the testicular mass, in which only the stolonic vessels with their numerous short, knob-like branches, their anastomosings, and young zooids are seen. This is *par excellence* the growing region of the colony. One rarely, if ever, finds young buds in other than this marginal zone, though in some cases they are found in what might be called the proximal portion of the colony, where there are long stretches of stolonic vessels bearing few zooids. The region in which the isolated zooids are shown in fig. 2 is one of this kind, and some of these are not fully developed. Why few or no zooids are present in these regions I am not sure, but think it possible that they have died and fallen away. It will be seen in fig. 4, pl. i, that the vessels do not extend into the test which is situated around and between the zooids; they are confined, for the most part, to the layer that forms the contact with the substratum of the colony. Their branching is mostly in a plane parallel to the surface on which the colony rests. This latter condition is well shown by the section represented in fig. 7, pl. i. A section of a portion of the testicular mass in which zooids are present, but vessels are not, is shown in fig. 5, pl. i. In some cases, the partition of test that separates two zooids is exceedingly thin, while in other cases it is of considerable thickness. In certain colonies, the zooids are so closely crowded together that they appear on cursory examination to have a common test; more careful inspection, however, discovers that this is not so; that the test is not continuous from zooid to zooid; they are only in contact with one another. This having been found to be the case in some colonies, it seemed quite possible that in other cases, where the test appeared to be a unit for the whole colony; where the zooids could not be separated by mechanical means, that this might be due to a still closer crowding together of the zooids, and that sections would reveal planes of contact between the tests of the different individuals. However, such examination proves beyond the possibility of a doubt that no such contact planes exist. As is shown by fig. 5, pl. i, which is drawn from a section of one of these colonies, the test is continuous from one zooid to another, entirely without interruption.

From the facts thus presented, the question arises, has this fully compounded condition been produced by such a crowding of the adult zooids of the colony that the tests have become fused by mutual pressure, aided, perhaps, by the constant renewal of the test by growth? Is it not possible that since these individuals of a colony have a common blood system, their tests grow together when brought in contact, after something the same fashion that the severed surfaces of a wound grow together when brought in contact? And it is possible that the process may be assisted by the slight irritation that would be produced on the surfaces in contact. One fact seems to favor such a view. Colonies may be found in which the crowded, but not compounded colonies. This is natural size, and the number and arrangement of the zooids are reproduced as faithfully as possible.

The appearance of the zooids when taken from the test is fairly well represented by fig. 3, pl. i, the outlines of which were drawn by the aid of a camera lucida. As compared with the other known species of the genus, the approximately spherical form and the terminal position of both orifices are noticeable. When the anterior end of the fully expanded living zooid is looked down upon, the outline presented is that of a rather broad ellipse with the two orifices situated at the foci.

The ease with which the zooids can be removed from the test in the fully compounded colonies is worthy of mention. In a preserved colony that has been cut in pieces, they may be picked from their little cavities in the test, reminding one of the way in which very young frog embryos may be picked from their gelatinous envelop. The only points at which they seem to be adherent are the extreme edges of the orifices, and the point of passage of the blood vessel from the body into the stolon. When we come to examine the minute structure of the test and the body layer in contact with it, we shall see that the union between the two is much more intimate than appears on gross dissection.

Another point to which attention may well be called in connection with the general appearance is the course of the transverse vessels of the branchial sac. The body is sufficiently transparent to permit these to be seen with considerable distinctness in a good light. As may be seen by fig. 3, the planes of these circular vessels are not situated at a right angle to the antero-posterior axis of the body, but they all converge on the dorsal side of it. This convergence is associated with a slight dorsal curvature of the antero-posterior axis itself. As compared with the form of *P. Listeri* (Lister, '34, pl. xi, fig. 2), it is as though the dorsally directed atrial siphon of this latter species had been brought to an anterior direction by bending dorsalward the entire posterior portion of the body. When well distended, the siphons are distinct in specimens removed from the test; and in such cases the marginal lobes of them, though not large, may yet be clearly seen with a slight magnification. In the individual shown in fig. 3 there were six lobes on the branchial siphon and five on the atrial. These are the most usual numbers, but they are not altogether constant. In several instances I have found six on the atrial also. The size of the lobes and the spacings between them may vary considerably. Thus it will be observed in fig. 3, that the interval between two of the atrial lobes is considerably wider and deeper than are those between the others.

2. THE TEST AND THE ORIGIN OF ITS CELLS.

In a majority of the sections which I have examined, the test presents a uniformly hyaline matrix, in which are scattered a few cells (figs. 29, 30, 31 and 32, *ts.*, *m. c.*)

never show as anything else than granules. They are so excessively small that I have not, even with a $\frac{1}{12}$ oil immersion objective, been able to determine much of their nature. From what I have seen in a single specimen stained in borax carmine, I have thought it possible that they may be bacteria. My grounds for this conjecture are not, however, very good.

It is a fact worth mentioning, perhaps, that in many cases there is a layer on the external surface of the test that takes the stain considerably more readily than do its remaining portions. This I have observed in sections stained in various ways. The layer is not, however, an external epithelium, such as is described by Maurice ('88, p. 58), in the larva of Fragroides. There is, I believe, but one kind of cells in the test, and this is an important fact in connection with what I shall maintain to be their origin. Figs. 29 and 30, pl. iii, represent portions of test containing several of these cells. The figure was drawn with great care, with the aid of a Powell and Leland $\frac{1}{12}$ oil immersion objective. The more usual condition is that shown in fig. 29. Here the cells are seen to be situated in cavities which they do not fill. The nuclei are by far the most distinct parts of the cells. Indeed, it is not until one examines them very carefully with high magnification and with the most favorable light, that he is able to convince himself that a cell-body can be seen at all.

I have not attempted to represent the spaces in which the cells are situated in any of the other figures, and in many cases they cannot be seen. Occasionally one finds cells in which the protoplasm is stained somewhat, though never so deeply as the nucleus. Instances of this kind are seen at *m. c.*′, figs. 29 and 30. It happens not infrequently that two cells are found in one capsule (fig.

29). It is probable that division has recently taken place in such cases, though I have never noticed a cell in the act of division.

Two papers have recently appeared which call seriously in question the view generally held by students of the Tunicata that the cells of the test are of ectodermal origin. The papers referred to are those of Salensky ('91) and Kowalevsky ('92). The first-mentioned author refers to the fact that Della Valle has observed the wandering out of ectodermal cells from the ectoderm into the "cellulose mantel," there to become transformed into the cells characteristic of this layer, and he then adds: "Ich kann eine solche Auswanderung auch für die Pyrosomen gelten lassen, muss aber annehmen, dass der grösste Theil der ausserhalb des Cyathozoids liegenden Zellen von asgewanderten Mesenchymzellen stammt" (p. 12.) "Wenn diese Zellen auswandern, so kann man sie leicht zwischen den Zellen des Ectoderms erkennen, und dadurch wird die Entscheidung der oben aufgestellten Frage über die Natur der ausserhalb des Embryos liegenden Zellen bedeutend erleichtert" (p. 13.)

And the author illustrates the conditions thus described auch bei den socialen und zusammengesetzten Ascidien constatiren." Salensky's paper having appeared about the time, or only shortly before Kowalevsky's observations were being made, the latter seems not to have been aware of what the former had said on this point.

As the testicular mass in these fully compounded colonies of Perophora is presumably growing constantly, it seemed to me that they offered a good opportunity for testing the assumption of Kowalevsky, quoted above, that in the social and compound ascidians, also, the test cells have a mesodermal origin. I have accordingly studied the point with considerable care, with what results the sequel will show.

The cells of the test of the growing colony must be derived from one or more of three sources: First, they may be the direct descendants of the original cells of the test of the larva from which the colony has been produced. Second, they may arise by division from the growing portions of the epithelial linings of the stolonic vessels, or, what is the same thing, the external epithelium of the body of the zooid. This epithelium is ectodermal, as we know from the method of development of the stolon, as first shown by Kowalevsky ('74). Third, they may arise from the mesenchymatous cells contained in the blood.

Their origin by the first method I can neither affirm nor deny, as I have studied neither the development of the larva nor its first-formed stolons. Even if some of them do have this origin, certain it is that not all of them do, as the following account will show.

Their origin by the second method, *i. e.*, from the ectoderm, I fully believe does not take place. I have searched through many sections prepared by many methods for evidences of it, but have failed utterly to find it.

There remains, then, only the third method by which they may originate. The evidence on which I base my belief that they arise by this last method is threefold: First, the cells of the test are wholly unlike the cells of the endothelial lining of the stolonic vessels, even at the tips of the vessels where the endothelium is thickened because of the growth that is there taking place. Both the endothelial cells and the test cells are shown in figs. 30 and 31, *ed. v*. The former invariably contain large, clear nuclei, usually spherical in regions where growth is taking place, but sometimes slightly flattened in the plane of the membrane to which they belong. These nuclei are from 4 μ. to 6 μ. in diameter. Each contains one large distinct nucleolus. The cell protoplasm, which is in considerable quantity, stains more distinctly than does the nuclear matter. There is no cell membrane, and the cells are irregularly stellate in form, this form being determined in part, no doubt, by mutual contact, though in preserved specimens they do not appear closely crowded; in fact (fig. 31, pl. iii) there are often seen irregular spaces between them. This is probably due to slight shrinkage.

or more blunt processes are seen projecting from it. As already said, these cells are very frequently situated in spaces, or capsules in the test matrix. Whether this is wholly due to the shrinkage of the cells I am not sure. Even when these cells are found so close to the endothelium as to be actually in contact with it, as very frequently happens, they are still of the same form, size and structure. This, of itself, is strong evidence against their having arisen from this endothelium. It is almost conclusive proof that they are not endothelial cells which have migrated into the test; and if they had arisen from these cells by division, it would still seem improbable that they should at once be so different from their mother cells. Again, it would seem that if they have such an origin, cases in which the division is going on might be found. Although I have searched diligently for such cases my efforts have been in vain.

My second reason for believing the cells of the test to be derived from the contents of the vessels and the body spaces is that cells are found here which are, so far as I am able to make out, precisely similar to the test cells. Figs. 30 and 32, *m. c*^{a}., pl. iii, show some of these, or rather their nuclei, in the first figure taken from one of the stolonic vessels, and in the second from the body space in the region of the branchial siphon.

Fig. 37, pl. iii, represents three of them from one of the vessels as they appear under the $\frac{1}{12}$ oil immersion objective. These are so similar to the cells of the test in size, form and behavior toward stains that they need no description. That which has already been given of the one applies in every respect to the other.

The third point which I present in evidence for my contention is that I have found the cells in the process of migration through the endothelium. The most convincing instance of this is shown in fig. 30, *m. c.*, pl. iii. Although neither nucleolus nor cell-body could be distinguished in this, still it differs in no way from many nuclei that are found on both sides of the membrane, *i. e.*, within the vessel and in the test. That it is embedded in the protoplasmic portion of the cells of the endothelium does not, I think, admit of doubt. I suppose it is passing between the two cells, the nuclei of which lie each side of it.

The same process of migration is seen also, I believe, in fig. 31. This is from a section which cuts the endothelium of a vessel tangentially, or rather at a very oblique angle. On one side of the section test alone appears, while on the other side endothelium appears only. It will be seen that in the region where there is no test three of these nuclei are found. Of course there is great danger of error here, since the endothelium is very thin and cells on its surface on either side may easily be mistaken as being situated within it. With this chance of error in mind, I have studied this and many other similar sections with care, and have convinced myself that several migration of cells takes place into the plug of test that fills the cavity of the ectodermal invagination. These cells are always strongly contrasted in their appearance with the ectodermal cells, and are entirely similar to cells of the kind already described, which are abundant in the blood spaces of this region. Although none of these cells have been found in the process of passing through the ectoderm at this point, it is still quite possible that such migrations may have been taking place without having been detected. All my sections that have shown this stage of development have been rather densely stained in this region.

It is thus seen that my results add one more instance to the two furnished by Salensky and Kowalevsky, in which cells of the tunicate test are not derived from the ectoderm but from mesoderm, or rather in the case here presented, from cells derived from mesoderm; for that such is the origin of the original cells of the blood in Tunicates is well known; the source from which the blood cells are renewed in adult life is, however, not so well known. It is quite certain, from the instances of division of some of them, as is shown in fig. 36*a*, that they are the source of their own renewal—that some of them, at least, always retain the power of reproduction. All the cells of the blood are frequently spoken of by writers on the tunicate morphology as "mesenchyme cells swimming in the blood plasma," e. g., Seeliger, '82, p. 405.

I must mention here that since completing these observations on this point, I find that Kowalevsky himself seems to have seen the same migration of cells from the blood into the test in *Perophora Listeri*, twenty years ago. Thus he says: "Souvent encore, ou peut réussir à voir des globules sanguins hors de la cavité des stolons, contre les parois du corps dans le manteau extérieur; ces globules ont perdu en partie leurs granulations graisseuses et se sont transformés en cellules voyagueses, puis ont formé les cellules manteau," p. 6. He then says he has never seen the direct passage of these "cellules amoeboïdes" through the wall of the stolon. I am at a loss to know why Kowalevsky does not recur to this in his recent paper—whether he does not consider it a case in point, or whether he had forgotten it.

I have never seen any indication of these cells performing a phagocytic function such as is described by Metschinkoff and Kowalevsky as taking place in the tests of other Tunicates. A considerable variety of foreign bodies is found on the surface and imbedded within the test of Perophora, but I have searched in vain for any signs of their being surrounded or ingested by the test cells. I have thought it possible that the unusual accumulation of the cells at the point where the branchial opening is about to form might mean that they are in some way instrumental in effecting the breaking through of the test. Of this I have no other proof, however, than the mere fact of their numerous presence at this point.

of the test is produced as a secretion of the mesodermal cells imbedded in it. It seems rather to be the product of the ectodermal cells by which it is lined; and this agrees with the more usual view of its origin. In many places, both in the stolons and in the developing zooids, the cells of the ectodermal layer have such a form as is shown in fig. 39, pl. iii. I believe this to be due to the fact that the cellulose substance of the test is here being formed. The processes are probably similar to the ones described by Salensky ('91, p. 14), in Pyrosoma, as likewise projecting from the ectoderm cells into the test. This author also regards the processes as having to do with the formation of the cellulose substance. He says, however, that they are found only at an early stage in the development of the individual.

3. THE MUSCULATURE.

The musculature of the mantle is confined to the anterior end of the body, as in other species of the genus. As seen in the whole animal, when examined as a transparent object, the longitudinal fibres are most conspicuous as they run backward, separated by wide and quite regular intervals, into a region where the test is particularly thin and transparent. (Fig. 3, *r. m.*, pl. i.) As seen by this figure, they are radially arranged, each bundle of fibres growing gradually smaller as it passes backward, finally disappearing entirely, usually before the second transverse branchial vessel is reached. A small fragment of the mantle from the branchial siphon is shown in fig. 18, pl. ii. The specimen is seen upon its external surface, consequently the circular fibres are generally situated internally to the longitudinal fibres. This, however, is not always the case, as for example, the radial bundle *r. m.'* passes under some of the circular bundles and over others, so that in part the two layers are interwoven. It is also an interesting fact that not infrequently fibres may be seen to branch off from a circular bundle and pass into, and become a part of a longitudinal bundle.

4. THE PHARYNGEAL APPARATUS.

To find some typical arrangement as to number, form and position of the tentacles, has been an object of much search, and this the more because of the unqualified statements on this point by Herdman ('91) with reference to the other species of the genus, and by Garstang ('91), with reference to *P. Listeri.* After examining a very large number of specimens, I believe the question, as I have treated it in the diagnosis, is as nearly definite as the facts will permit. In the fully compound colonies I have found in some individuals fourteen, in one at least eleven, and in another ten. As to length and distribution, fig. 20 illustrates an average condition. There are almost as many different lengths as there are tentacles, the shortest being mere buds, while the longest are of considerable length. The longest are generally situated nearest the peripharyngeal band.

some specimens, and as few as sixteen in others, the shortest ones often being so short as to be nothing more than buds that can be seen only by the aid of considerable magnification. It seems to me not at all impossible that new tentacles are constantly being formed for a long time after the individual animals have reached the adult condition. There is an evident tendency in some cases for the shorter and longer tentacles to alternate, though, as already said, the circles of shorter and probably younger ones are always nearer the orifice than are the circles of longer ones.

a. PARASITES OF THE TENTACLES.

At this point may be described an interesting tentaculiferous infusorian that occurs parasitic on the tentacles and neighboring inner surface of the branchial siphon, usually on or near the peripharyngeal band. A group of the infested tentacles and a few of the parasites on the peripharyngeal band are shown in fig. 16, pl. ii, and a single tentacle is shown, more highly magnified, in fig. 17, pl. ii. The impression received at first sight is that one has before him abnormally shaped ciliated tentacles, the cilia being disposed in tufts. As seen by the figures, each tentacle is club-shaped, the terminal knob bearing a tuft of the coarse, usually long cilia. Besides the terminal knobs there are numerous others scattered irregularly on the sides of the tentacles, also bearing the cilia in most cases, though not always. As just stated, most of the cilia are long. Not unfrequently, however, tufts are seen in which they are short and distinctly clavate (fig. 17). These latter are generally more numerous in each tuft than are the longer ones. Almost without exception the knobs, whether at the ends of the tentacles or on their sides, or on the peribranchial band, contain from one to several very distinct round cells, each cell having an equally distinct, centrally situated round nucleus. The large knobs terminally situated on the tentacles usually contain more of the cells than do the lateral ones.

That we have here one of the tentaculiferous Infusoria I think there can be no doubt, but I have been much puzzled to know what interpretation to put upon several appearances presented. It may be supposed that the cells described as being situated within the knobs are the anamalcules that have made their way into the tissue of the host, and that the knobs are produced as a pathological growth from the infected tissue. The parasite might then be regarded as belonging to the genus Sphœrophrya of Claparède and Lachmann. However, there are several difficulties in the way of this view, one of which is, I think, fatal in itself. It will be noticed that the tentacles (of the parasites, for such undoubtedly are the structures which I have described above as "coarse cilia") are always situated, not on the cells embedded in the knobs, but clearly on the knobs themselves (figs. 16*b* and 17, pl. ii).

The explanation that seems to me to be most in accord with the facts observed is that the knobs, whether ter-

Another point that adds weight to the interpretation adopted is found in the fact that close examination does not discover in the knobs any of the cellular structure characteristic of the normal tentacle, and I believe that there is a thin ectosarc on the outermost surface of the knob; though of this I am not fully satisfied.

This view of the matter would seem to make the organism allied to the genus Podophrya as defined by Kent ('81-'82, vol. ii, pp. 806 and 813).

However, more study of the animal will be necessary to fully determine its affinities. I have not seen any living specimens. Only a small number of the infected colonies have been found, and these were all in my collection of preserved material.

b. THE BRANCHIAL BASKET PROPER.

As seen by fig. 3, pl. i, the long axes of the stigmata take the direction of the curved antero-posterior axis of the branchial sac as a whole. The convergence of the circles of the transverse vessels on the dorsal side, already mentioned, produces the effect that the stigmata are longest at the ventral, or endostylar side of the branchial sac, and become gradually shorter toward the dorsal side.

The papillæ of the transverse vessels are easily seen through the walls of the body when the animal is removed from the test and viewed by transmitted light (fig. 3 *i.p.*). There are from about six to eight on each half of each transverse vessel, making on the average about one papilla for each two stigmata, though the first in each row from the median dorsal line is removed five, or six, or more stigmata from this line, and are farther from this line than are the first ones on the ventral side from the endostyle. The middle papillæ of each series on each side of the body are somewhat larger than those nearer the endostyle on the one hand or the dorsal lamina on the other. Figure 13, pl. ii, represents one of the papillæ of about the average size and shape. The lateral processes are always present, and of varying length, each one sometimes nearly equaling half the distance between the horizontal vessels. I have, however, never found them connected with the corresponding processes of the adjacent series to form complete internal longitudinal bars, as is said by Garstang, '91, to be the case in some instances in *P. Listeri*, and as sometimes happens, as I have observed, in *P. viridis*. There is considerable variation in the lengths of the middle portion (*p*. fig. 13) in the different papillæ. In some cases it is relatively considerably longer than in the specimen here figured, being nearly as long as the lateral processes. The papillæ and their processes always contain a lumen continuous with that of the blood vessel on which they are situated, as represented in this figure; and the walls of the proximal, or convex sides of the processes, are always thickest. The cells here are large and round or even columnar, while those of the concave sides are much smaller and often flattened. The diary bands" (*m. i. b.* and *o. i. b.*) of Fol, and the cells carrying the long cilia at the bottom of the furrow (*m. c. c.*)

Both the intermediary bands are ciliated, though the cilia are quite different in the two cases, those of the outer band being considerably shorter and more spike-like than those of the middle band (*vd.* figure). Likewise, there is quite a marked difference between the cells of the two bands, as the figure shows. Those of the middle band form but a single layer, and are cuboid, with round nuclei; while those of the outer band are two or three deep, and are considerably elongated, and contain spindle-shaped nuclei. And further, the latter stain much more deeply than the former. In this respect they resemble the cells of the middle ciliated band, *m. c. c.*, much more closely than those of the inner ciliated band. The middle band is, however, but one cell deep, these cells being very long funnel-shaped. Their broad ends are directed inward, and bear the extremely long cilia so characteristic of the tunicate endostyle. The distinctness with which these cells are stained by acetic acid carmine, as compared with those of the glandular pads on either side of them, renders them very striking in the sections. The glandular pads (*i. g. c.*, *m. g. c.* and *o. g. c.*) are usually considerably thicker in proportion to their width than in the section here figured, this being caused by the cells being longer, not by the pads being more than one cell deep.

d. THE SUB-NEURAL GLAND.

The duct, particularly the opening of it, differs somewhat from that of *P. Listeri*, as described and figured by Garstang ('91, p. 60, and fig. 5).

As seen by fig. 21, pl. ii, *d. t.*, and as already mentioned in the diagnosis, the opening is not in the median line, but is thrown off considerably to the right. (The figure represents the parts as seen from within the branchial basket.) It appears from Garstang's figure that there may be a tendency of this kind in *P. Listeri*, but he says nothing about it in his description, and certainly if it were so strikingly true as is the case in this species, he would not have failed to mention it.

There is a distinct thickening of the lip of the peripharyngeal groove in the vicinity of the opening of the duct, and at a high focus, when the structure is seen from the inside, it is found that the wall of the duct becomes continuous with this lip of the groove (figs. 15 and 21, pl. ii, *d. t.* and *p. b. g.*) By the same figures it is seen that this thickened lip of the groove makes a U-shaped bend at this point, in the median line, the convexity of the U being directed posteriorly, or toward the ganglion. The mouth of the duct is always, so far as I have observed, at the right of the U. The "raised triangular area whose apex is posterior," mentioned by Garstang, is probably represented in my fig. 21 by the thickened posteriorly curved band behind the U. Although at a organ fail to adequately represent the differentiation of it into the well-defined sections that actually exist in it.

I had thought, before having an opportunity to examine any of the other species, that since none of the descriptions or figures of the organ under consideration show in any but a most indistinct and partial way several features that are quite obvious in this species, that perhaps a considerable difference existed here between this and the other species. As, however, I find on examining *P. viridis* that essentially the same structure here obtains, it is quite certain such is likewise the case throughout the genus. Fig. 9, pl. i, represents the digestive tract as it appears when dissected from the animal and examined in toto. There are five quite distinct regions to be recognized, instead of three, as described by R. Hertwig ('72, p. 90), and many other writers, for many tunicates. Whether these all correspond, both morphologically and physiologically, to the five regions described by Milne-Edwards ('42, p. 275), in the same organ in Clavelina, I am not sure; nevertheless, I use his terms to designate them. These are: *œ.*, œsophagus; *st.*, stomach; *int.'* duodenum; *int.''* intestine consisting of: *ch. v.*, the chylific vesicle, and *rc.*, the rectum.

Maurice ('88) finds five regions in the digestive tract of Fragroides, to which he also applies the same terms. The œsophagus is short and wide, and there is no valvular constriction at its entrance into the stomach, as is the case in some tunicates. At the passage from the stomach into the duodenum there is a pronounced constriction, and the narrow proximal end of the duodenum is thrust into the much wider stomach, to which it is joined so that a pronounced lip, or fold is formed around the orifice. This structure is readily understood by reference to fig. 22, pl. iii, which represents a nearly longitudinal section through this region. The index lines *st.* are directed to the lip on opposite sides of the orifice. The figure also shows that the lumen of the duodenum becomes considerably expanded immediately behind its junction with the stomach. But it is at the entrance of the duodenum into the chylific vesicle that the most pronounced valve occurs. This is shown in part in fig. 9, pl. i, but much better in the series of figs. 23, 24, 25 and 26, pl. iii, taken in serial order from the duodenum toward the chylific vesicle; *l. d.* in each section indicating the lumen of the duodenum. It will be seen that in 25 the lumen has become much narrowed, while in 26, where the cœca of the chylific vesicle become confluent with it, it is almost closed. These four sections also show well the relations of the cœca. The section shown in fig. 25 is three sections—about 40 μ—farther back than that shown in fig. 24; and the one shown in 26 is two sections—about 24 μ—back of the one shown in 25. It is thus seen that they are not deep. Fig. 26 is taken from the region where they all become confluent with the chylific vesicle, just at the entrance of the duodenum into this latter.

I should call attention to the deep pits in the inner sur-to indicate that they have no function to perform different from that performed by the remaining portions of the epithelium. I am also unable to determine that the cells are essentially different in them.

Histologically the digestive tract likewise presents some conditions of structure that are worthy of notice. The wall of the œsophagus is composed, as is apparently universal in Tunicates, of very regular, columnar, ciliated epithelium, with a thin basement membrane on its external surface. In almost all cases the inner third of the cells stains much more deeply than do the remaining portions.

As we pass to the walls of the stomach, a pronounced change in structure is seen. The cells become much higher and the cilia are absent. Fig. 27, pl. iii, represents the typical structure in this region. As here seen, the wall *appears* to be made up of uniform, high, cylindrical cells, *that are not in contact with one another*. These cells stain readily in hæmatoxylin, carmine or cochineal, and each contains a distinct, round, clear nucleus, in the center of which is seen a single large nucleolus. The nuclei are situated, on an average, about one-fourth of the length of the cells from their outer ends, and are usually so great in diameter as to make them appear to extend entirely across the cell. I have said that the epithelium *appears* to be made up of these cells, which are not in contact. What the actual structure is, becomes obvious when a tangential section is examined, particularly where such a section is at the niveau of the nuclei of the cells described. A drawing of such a section, highly magnified, is shown in fig. 28, pl. iii. We here see the same large, clear nuclei, *c. d.*, with a thin layer of stained protoplasm around them, and among these cells numerous much smaller, unstained, clear, circular areas, *c. c.*

These again are separated from one another by a small quantity of fine granular matter—intercellular substance, I take it to be. The bodies *c. c.* are probably small cells, since in many of them what seem to be nuclei are found. The large, distinct cells are undoubtedly digestive cells, since the secreted matter can often be seen forming globular or semi-globular masses at their inner extremities. They seem to be similar to the gland cells found in the stomach of other Tunicates (Sheldon, '88; Roule, '85; R. Hertwig, '72, and others). It is possible that Roule ('85) may have seen cells similar to the small, clear ones described above, in *Polycarpa varians*. After speaking of the glandular and hepatic cells in the stomach of this species, he says: "Certaines cellules même sont entièrement hyalines, et possèdent l'aspect typique des cellules calicinales à mucus" (p. 65). This structure of the stomach of Perophora as shown in fig. 28, pl. iii, resembles considerably a figure representing a surface view of the wall of one of the cœcal appendages of the stomach of Salpa, given by Dolley ('87, fig. 11, pl. xiii). In the text, however, he of the wall, as it is seen in section (fig. 22 *st'*., pl. iii), giving a striated appearance to the sections. These cells bear short cilia, and on the inner surface of the entire epithelium is found a series of very regular elongated granules deeply stained by hæmatoxylin (fig. 22 *c. g.*) Whether or not these granules are produced by an artificial breaking to pieces of a cuticular lining of the epithelium I am unable to say positively. However, from their constancy and regularity, and from the fact that in some regions their greatest length is directed at right angles to the surface of the epithelium, I believe the intervals between the blocks are the expression of fine pores which penetrate a cuticula. I have not been able to decide whether the cilia are situated within or between the pores. This porous cuticula, if such it be, extends through the entire length of this portion of the intestine, even into the mouth of the cœca at the junction of these with the chylific vesicle. It does not, however, extend into the extreme depths of the cœca (fig. 26, pl. iii).*

Two kinds of cells enter into the structure of the walls of the cœca themselves. The proximal portions, and a greater part of their extent are composed of cells quite similar to those found in the walls of the duodenum. Their nuclei are, however, more distinct here than there (figs. 24, 25 and 26, pl. iii). At the extreme tips of the cœca are found a comparatively small number of cells considerably larger than those of the other portions. The boundaries of these are also more clearly defined, as are also their nuclei, and the protoplasm is recognizably granular (fig. 26ª, pl. iii *g. c.*) I have no sufficient reason either for or against the supposition that these are hepatic cells. They are apparently quite different from what have been regarded as cells of this kind in many other Tunicates. Maurice ('88, p. 178), considers Milne-Edwards in error in regarding the "ventricule chylifique" as being glandular, and he states that in Fragroides the epithelium lining it is the same as that lining the œsophagus. Such is certainly not the case in Perophora. The cells are not ciliated as in the œsophagus. They are, also, considerably higher here than there, and as far back toward the rectum as the folds which lead to the cœca extend, pellicles of secretive matter are abundant on their inner ends. It appears to me that this part of the digestive tube, including the cœca, is undoubtedly secretory, and that exclusively.

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* It is possible that these structures are similar to the enlarged portions of the "cordons protoplasmiques" described by Maurice ('88, p. 168) as existing in the epithelium of the œsophagus and rectum of Fragroides. However, in Perophora they are found in the duodenum and not in the œsophagus and rectum. Moreover, I cannot make out that they are connected with the cilia, or that there are any protoplasmic filaments running down into the cells from them.

The walls of the whole rectal portion of the intestine, including the posterior part of the region over which the "organe refringent" of Girard ramifies, is composed of a single layer of rather low epithelial cells which are brane très-délicate qui les fixe assez lâchement à l'intestine." And he further states that in some cases the ampullæ sometimes project into the blood space surrounding the intestine without being at all in contact with the latter. I believe the structure is considerably more intimately related to the intestine than the description of this author would lead us to understand. In sections through this region (which he seems not to have made), one sees that in general the exceedingly thin walled ampullæ are so closely applied to the intestinal wall that it is often impossible to distinguish more than one layer separating the lumen of the ampulla from that of the intestine.

This fact may be important, it seems to me, as bearing on the question of the function of the organ. I have likewise failed to find the sudden and marked transition from the flat cells of the ampullæ to the much higher cylindrical cells of the ducts, as described and figured by Chandelon; and I can find nothing in the structure of the organ to warrant the assumption that its function is secretory in the strict sense of the word.

I have never found an individual in which the organ was wanting, as Girard ('72) states to be the case occasionally in some Tunicates, according to his observations.

PARASITES IN THE DIGESTIVE TRACT.

In fig. 22, pl. iii, x, x' and x'', I have represented some bodies concerning the nature of which I am in much doubt. That they are a stage in the life of some gregarine, seems to be the most reasonable suggestion that I can make, and this seems the more reasonable since an undoubted representative of this group of protozoa is found in the stomach, not only of this same individual, but also of several others. As to what stage it represents, or to what species it belongs, I have, however, not been able to gain any satisfactory clew. Lacaze-Duthiers ('74) has described and figured several parasites found by him " flottant dans le liquide du corps de Bojanus " of Molgula, one of which (fig. 4) he represents as having irregular circular bands, apparently of some such character as those of the bodies here described. Beyond this, however, there would seem to be little similarity between the two parasites, Some of the organisms here described by Lacaze-Duthiers he thinks are gregarines; these particular ones, however, he says, are " evidently vegetable."

As seen by the figure, the bodies which I find are quite large. The largest reach a length of 40μ. These larger ones are always considerably longer than broad, though their proportions vary considerably. Usually they are somewhat egg-shaped, with a slight prominence projecting from the smaller end, reminding one of the epistomium of some of the gregarines. The smaller ones are spherical, or very nearly so.

Perhaps the most characteristic feature of these strucagain (x') are buried in the wall of the organ, undoubtedly on their way through.

My reason for thinking that they pass from within outwards is, that one finds, as he examines carefully the wall just beneath where one pierces for a little way in from the outside, that there is a slight break in the wall; whereas no such break is found when the body pierces part way into the wall from the inside.

In many, though not in all, a well defined nucleus is present. The bands are absent from the smallest ones. I have found them only in the duodenum and chylific vesicle—never in the stomach itself, where the undoubted gregarines are found.

6. REPRODUCTIVE SYSTEM.

The only point in connection with the reproductive organs about which I need speak relates to their variability. This applies particularly to the testis. Thus, in fourteen individuals examined in one colony, the testis had either one lobe, or one lobe with a trace of a second. In seven others of the same colony it had three lobes.

In a second colony fourteen individuals were also examined, and in all cases here there were many lobes, so many as to make it impossible to count them with certainty. Six other individuals of this same colony had a less number, varying from one to four.

In twelve specimens examined from a third colony no trace of either testis or ovary could be found. And, it should be said, that this entire absence of the genital glands is very common in the species. Indeed, my observations seem to indicate that it is a rule rather than an exception, particularly as regards the fully compounded colonies. I ought to mention here that none of the numerously lobed testes have been found in these colonies, and this is one of the facts that leads me to think it possible that another species may be recognized on further study. Certain it is, however, that the point cannot be fully determined until representatives not only of numerous localities, but also of numerous ages of the colonies and individuals, and of different seasons of the year, have been carefully studied.

Kowalevsky has stated ('74, p. 18), and his statement has been confirmed by other observers, that in *P. Listeri* the male genital products are matured before the female; so that the hermaphroditism is protandric. Whether this is true or not for this species is uncertain; but the facts so far observed do not seem to indicate it. In many cases, as e. g. the one represented in fig. 19, pl. ii, in which both sperm and ova are well developed, I see no grounds for considering either as more nearly mature than the other. In some individuals the ovary is considerably more voluminous than the testis, while in others again the reverse is true. I have never seen either sperm or ova in the process of being discharged.

7. CIRCULATORY SYSTEM AND BLOOD.

counted in five individuals, the maximum in one direction without a reversal was 208 in 2 min. and 9 sec., while the minimum was 25 in 1 min. and 53 sec.

In another individual examined, the examination beginning without counting, the contractions were found to continue in the same direction for so long a time that I began to wonder if this individual formed an exception to the rule governing the heart movements in Tunicates. With this I began to count, and 302 strokes in the same direction were performed in 7 min. before the reversal took place. As I am quite certain that at least an equal number of strokes were performed before the counting began, and an equal time had elapsed, it would thus follow that the strokes in the same direction without reversal continued 14 minutes and were about 600 in number. Of course, I have no means of knowing how long it may have been running in the same direction before my examination began.

From my observations, it seems quite certain that the total number of strokes in one direction is considerably greater than those in the reverse direction.

Thus, in one individual, of the 2,392 strokes counted. 1,485 passed from the ventral toward the dorsal side of the animal, and 807 in the opposite direction; and in every instance of reversal but three, the greater number was in this direction. Similar results were obtained by observations upon several other individuals. Whether the greater number of strokes is in the same direction for all individuals, I am not certain.

As one watches attentively the movements of the heart, the impression is received that toward the close of a period of contraction in a given direction, the fluid has become condensed in the arterial vessels. A tendency to regurgitation is frequently noticed at such times, indicating that the fluid is under pressure, Indeed, I am inclined to think that such is the case; and it appears to me highly probable that to this is due the origin of this method of heart movement. We know from the studies of Lacaze-Duthiers, Roule, Herdman and others, on various groups of Tunicates, that what, for the present consideration at least, corresponds to a quite extensive system of systemic capillaries exists in many species. Besides, the area of surface of the containing vessels within the branchial apparatus must be much greater than that of the afferent vessels; consequently the friction which the moving fluid must here overcome must be correspondingly increased.

So far as the retarding influence upon the blood of the capillaries is concerned, we may then regard the blood of Tunicates as having to be driven through two systems of them, i. e. a branchial and a systemic, by the same impulse of the heart in either direction.

Now, it would seem that the collateral aids to the work of the heart, which are made use of in various ways and to varying degrees in most other animals in which a well-formed blood circulatory system is found, are very poorly, high a grade of development as is found in any Tunicate, I may quote Roule '85, p. 106: "Les canaux sanguins, sauf le cœur, n'ont pas de parois propres, isolables du tissu environnant; les plus simples d'entre eux ne possèdent que leur mince endothélium, et resemblent tout à fait aux espaces laissés, chez les animaux supérieurs, entre les faisceaux du tissu conjonctif; les plus complexes ont une enveloppe musculaire, mais les éléments de cette enveloppe ne lui appartiennent pas en entier, et font aussi partié en substratum conjonctivo-musculaire environnant. Le cœur seul possède des parvis propres." This rudimentary condition of the vessels is still more pronounced in such comparatively primitive forms as Perophora, where even the main vessels or merely such channels, i. e., the median ventral, and the median dorsal trunks, possess the thinnest, most imperfect kind of a wall of connective tissue fiber and endothelium. I can detect no trace of muscle fibers in them.

Considering then the tunicate blood system in the light of Weber's "Schema of the Circulation," we may fairly conjecture that by the retarding effect upon the blood stream produced by the systemic lacunæ and the branchial network of small vessels, and by the absence of elasticity and valves from the larger vessels, before a degree of pressure was reached in the arterial system sufficiently great to force the blood through the two connecting systems rapidly enough to return as much blood to the heart by the veins as was being forced from it into the arteries, a regurgitation of blood into the heart resulted which in some way produced a reversal in the direction of the contractions.

Since reaching this conclusion concerning the cause of the reversed movements of the heart, I find that Roule ('85) has arrived at one apparently somewhat similar.

Thus at the close of his "Considerations Générales" on the circulatory system of the Cynthiadie, he says, p. 93: "Enfin, cette structure spéciale de l'appareil circulatoire a déterminé, conjointement peut-être avec la position interne de l'organe de la respiration, le changement alternatif du sens des courants circulatoires, afin que le sang artériel puisse parvenir à tour de rôle dans tous les organes (voy. mémoire, No. 40, p. 141 á 151)." Unfortunately I have been unable to consult his paper here referred to.

The peculiar twisting of the heart during systole, such as has been shown by Girard ('72) and Della Valle ('81), is represented in figure 11, pl. i. It is worthy of mention that the twist is in the same direction which ever direction the wave of contraction may be passing.

THE BLOOD.

As is apparently the rule among Tunicates, so likewise in this species, the cells of the blood present a great variety of size, form, and behavior towards reagents. It is exceeding difficult to decide which of these are the most typical and constant, or what is the relation between variety. One of these is shown in fig. 36*a*. No metotic figures have been seen.

The variety represented by figure 37 is less regular in form, is usually considerably smaller than the preceding, and the cytoplasm is generally almost wholly unstained, thus rendering the outlines of the cell very indistinct. The nucleus is relatively considerably smaller than that of the preceding variety, containing less nuclear sap. These are the cells that are like the ones found in the test, hence their relations to these latter have already been sufficiently dwelt upon. The next kind of cells—or rather of bodies, for they can hardly be called cells—is represented by fig. 38. They are distinctly marked generally by their large size, their being densely stained, and usually, though not in all individuals, by their irregular form giving them the appearance of having been greatly contracted. And this, I think, is undoubtedly the case since in a few specimens I have found them usually large and regular in outline. In the shrunken, deeply stained ones, no nuclei can be seen; but in the ones not thus shrunken and stained a relatively small, well stained nucleus is present. The plump ones, as they may be called, are very large—several times the volume of the largest ones of the first described variety—and the protoplasm has a fine granular structure.

The fourth variety, shown in figures 35, 35*a*, 35*b* and 35*c* seem to correspond to what are usually described in other Tunicates as pigment cells; though if the granules which are so conspicuous in them are pigment, which I greatly doubt, they are certainly, in this species, quite different from any pigment known to me; they seem to me to be fragments of the broken-down cell body. In hæmytoxalin they become intensely stained, but some other stains, e. g., Mayer's cochineal, attack them very little or not at all. I am pretty well convinced that these are cells of the first variety breaking to pieces; they are worn-out blood cells. Several stages in the process are represented in the figures referred to. In 35, the granules are for the most part confined to a single layer on the surface of the cells; many cases can be seen in which they are found exclusively thus disposed. In such cells the nucleus is still intact and distinct. The other figures taken in order explain the various stages of disintegration as I suppose it to take place. The nucleus is the last portion of the cell to disappear. Many of the detached fragments are found in some specimens scattered among the cells in the blood.

I have no convincing evidence concerning the relations existing between the other varieties.

Since my manuscript passed into the printer's hands, Seeliger's recent paper ('93) on the origin of the "external mantle" of tunicates has reached me. This author, instigated by the observations of Kowalevsky, has reviewed the question of the origin of the cells of the test with the result that Kowalevsky's conclusions are fully confirmed, excepting in Appendicularia. In this

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EXPLANATION OF FIGURES.

NOTE.—All the figures, excepting 1, 2, 3, 10, 11 and 26a, were outlined with the Abbe camera lucida, and as much of the details were drawn by the same means as the nature of the object would permit.

PLATE I.

Fig. 1. Small portion of a colony of *Perophora* on a leaf of Phyllospadix. Natural size.

Fig. 2. Small portion of a colony on a piece of sea weed. In this colony the ascidiozooids are mostly much crowded and wholly embedded in the common test; but a few (*i. zo.*) are isolated. × 2.

Fig. 3. A single zooid removed from the test. In the colony from which this individual was taken the zooids were much crowded, and almost completely covered a large Clavelina. × 30.

Fig. 4. An enlarged portion of a colony, wholly compounded form, on a leaf of Phyllospadix. The figure shows the edge of the colony where the branching and anastomosing of the stolonic vessels, and the knob-like terminations are well seen. × 23.

Fig. 5. Small portion of a section of a colony, to show the completeness with which the zooids are enveloped in the common test. × 25.

Fig. 6. Section of a small portion of the tip of a stolon, with its thickened epethelial lining (*ep. v.*), and two very young buds (*bd.*). × 53.

Fig. 7. Cross section of a stolonic mass enveloping a sartularian hydroid (*hy.*) stem. × 50.

Fig. 9. Digestive tract. × 109.

Figures 10 and 11, drawn from the living animals, to show the spiral form assumed by the heart wall during systole.

PLATE II.

Fig. 12. Small portion of most anterior transverse vessel with its papillæ, the dorsal lamina and one of the dorsal languets. Seen from within. × 109.

Fig. 13. A single papilla. × 350.

Fig. 14. The branchial orifice and its lobes, seen from the outside, the zooid removed from the test. × 109.

Fig. 15. Ganglion and subneural gland and its duct, seen from within. × 316.

Fig. 16. Some of the tentacles, with parasites seen from within. × 115.

Fig. 17. Section of one of the infected tentacles, more highly magnified. × 230.

Fig. 18. Small portion of the musculature of the branchial siphon, seen from the outside, test removed. × 230.

Fig. 19. Testis and ovary of the Santa Cruz Perophora. × 109.

Fig. 20. Tentacles and peripharyngeal band, seen from within. The fully compounded form. Dorsal tubercle not well seen in this specimen. × 109.

Fig. 21. Corresponding parts and same view, excepting that more of the dorsal portion of the branchial sac is seen, of the much crowded not compounded form. × 109.

PLATE III.

Fig. 22. A nearly longitudinal section of the stomach and duodenum. × 230.

Figs. 23, 24, 25 and 26, represent transverse sections of the posterior of the duodenum, passing, in the order of the numbers, toward and into the chylific vesicle. × 109.

Fig. 26a. Diagramatic figure of the glandular portion of a cœcum of the chylific vesicle.

Fig. 27. Cross section of the wall of the stomach. × 475.

Fig. 28. Small piece of a tangential section of the wall of the stomach. × 820.

Fig. 29. Small piece of a section of the test. × 700.

Fig. 30. Cross section of test and the epithelial lining of the stolonic vessel. × 790.

Fig. 31. Portion of a tangential section of the test and its epithelial lining. × 640.

Fig. 32. Section through the point at which the branchial siphon of a developing bud is about to break through the test. × 475.

Fig. 33. A section similar to the preceding, but at a considerably earlier stage. × 475.

Fig. 34. Cross section of the endostyle.

LIST OF ABBREVATIONS USED IN THE FIGURES.

a.	anus.
at.	atrium.
at. o.	atrial orifice.
b. c.	blood corpuscle.
bd.	buds.
b. s.	blood sinus.
br. o.	branchial orifice.
br. s.	branchial sac.
c. b. b.	inner ciliated band.
c. c.	clear cells of stomach.
c. d.	digestive cells of stomach.
c. g.	cuticular granules on the inner surface of the wall of the duodenum.
c. g′.	coagulated blood plasma (?).
c. m.	circular muscle fibres.
c. m′. and *r. m.*	circular and radial fibres which interweave.
con. d.	connecting duct of internal papilla.
cæ.	cœcum of chylific vesicle.
c. v.	vessels crossing peribranchial chamber.
d. g.	subneural gland.
d. l.	dorsal lamina.
d. m.	dorsal muscle fibres.
d. t.	dorsal tubercle.
dv.	duct of dorsal gland.
ed.	endostyle.
ep. v.	epithelium lining stolonic vessel.
ed. v′.	epithelium of stolonic vessel in tangential section.
ep. b.	epithelium of exterior of body.
ep. i.	epithelium of inner surface of branchial siphon, with long processes.
ep. s.	epithelium of interior of branchial sac.
g. c.	glandular cells of intestinal cœca.
g. cæ.	pits of the duodenum.
gl.	ganglion.
ht. d.	heart diastole.
ht. s.	heart systole.
hy.	hydroid stem.
i. g. c.	inner glandular cushion.
i. zo.	isolated zooids.
int.	intestine.
int′.	duodenum.
int″.	intestine proper.
i. p.	internal papilla.
l.	languet.

l. d. lumen of digestive tube.
l. p. lateral processes of papilla.
m. c. migratory cell passing through epithelial lining of vessel.
m. c'. migratory cell in test.
m. c^a. migratory cells within the vessels.
m. c. c. median ciliated cells.
m. i. b. middle intermediary band.
m. g. c. middle glandular cushion.
n. nucleus of "swarm spores."
n^2. probable nucleus of parent parasite on tentacle of host.
œ. œsophagus.
o. g. c. outer glandular cushion.
o. i. b. outer intermediary band.
ov. ovary.
p. inner end of connecting duct of papilla.
pc. pericardium.
p. b. g. peripharyngeal band.
rc. rectum.
r. m. radial muscle fibres.
sep. Septum of stolonic vessel.
st. stomach.
st'. cells transitional from stomach to duodenum.
sti. branchial stigmata.
st. v. stolonic vessels.
t. tentacles.
t. p. pouches of testis.
tr. v. transverse vessel.
ts. test.

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STUDIES IN PORTULACACEÆ.

BY KATHARINE BRANDEGEE.

Many of the plants of this order are difficult of investigation in herbarium specimens. The texture of the corolla is often so delicate that it can only be unfolded with considerable trouble. The frequently minute crustaceous seeds are equally troublesome. The slow process of germination can only be resorted to in a few species at once, and in dissection they require more than usual care. That they have been neglected is evidenced by Dr. Gray's remark concerning the accumbent cotyledons of *Lewisia rediviva*, "So far as we know, it is not so in any other Portulacaceous plant, not even in *L. brachycalyx*."[*] This supposed exceptional position of the embryo is the character relied upon by Mr. Howell in separating the second species of Lewisia, and with it aggregating all the forms of Claytonia and Calandrinia having a circumscissle capsule, under the generic name of Oreobroma.[†] The discovery of some undescribed forms in the herbarium of the California Academy of Sciences having led

Cotyledons incumbent.

Calyptridium.
Monocosmia.
Sylvæa.
Spraguea.
Lewisia brachycalyx.
Claytonia ambigua.
Claytonia rupestris.
Calandrinia maritima.
And all the species examined of Portulaca and Talinum.

Cotyledons accumbent.

Montia fontana.
Claytonia perfoliata and all its varieties, parviflora, spathulata, etc.
Claytonia Sibirica.
Claytonia Chamissonis.
Claytonia linearis.
Claytonia lanceolata.
Lewisia rediviva.
Calandrinia pygmæa.
Calandrinia oppositifolia.
Calandrinia Columbiana.
Calandrinia Menziesii, somewhat oblique.
Calandrinia Breweri, " "

Cotyledons oblique.

Claytonia parvifolia.
Claytonia diffusa.
Claytonia megarrhiza.
Lewisia Kelloggii.
Calandrinia Nevadensis.
Calandrinia Cotyledon.
Calandrinia Howellii.

Cotyledons conferruminate.

Claytonia Virginica.*

Claytonia triphylla.

The circumscissile species included in the proposed Oreobroma show examples of all these different positions of the embryo. The tetrasepalous calyx, which, according to Dr. Gray, makes the only difference between Lewisia and Calandrinia, fails in the variety described below. Mr. Howell is, I think, quite correct in saying of *L. brachycalyx*, "sepals apparently 4," for the lower sepals are plainly seen to be bracts, often indeed at a considerable distance below the others.

Lewisia Kelloggii.—Caudex and fleshy root 4–5 cm. long: outer bracts scarious, 1½–3 cm. long: leaves 2–3 cm. long; petiole thick, broad and flattened, wrinkled in drying, narrowing upward, to the shorter obovate blade: peduncles stout, terete, 6–15 mm. long, jointed at the very base, broad at the summit: sepals 4, ovate-lanceolate, 8–10 mm. long, glandular on the margins: petals (9 in the only flower unrolled) oblanceolate, unequal in breadth, 8–12 mm. long: stamens about 15 (too many in the figure),

Lewisia rediviva, var.? **Yosemitana**.—Caudex very short; fleshy root very slender: leaves succulent, linear or spatulate, 1–2 cm. long: pedicels cylindrical, ½–1 cm. long, jointed just below the flower and crowned by three ovate scarious bracts: sepals 2, broad, concave, emarginate or more deeply notched at top: petals 5, about 2 cm. long, exceeding the sepals: stamens about 15: style rather shortly cleft; ovary circumscissile from a broad base; seeds too young for description. The flowers fall from the jointed pedicel, in drying, even more promptly than in the type.—Collected somewhere about Yosemite Valley, by Mrs. Willie F. Dodd, in the summer of 1891.

This plant has so much the aspect of a depauperate *L. rediviva* that in lack of mature fruit, I prefer to describe it as a variety of that species. Whether it prove to be distinct or not, it is plainly related more closely to *L. rediviva* than is any other species, and effectually breaks down the remaining barrier between Lewisia and the Lewisioid section of Calandrinia. There remains then only to consider whether all these species shall be united with Lewisia on the common characters of the circumscissile capsule and persistent style, or whether Lewisia shall be merged into Calandrinia. I think the first would be the more convenient. Dr. Gray says that circumscissile dehiscence occurs in some South American species of unlike habit, but does not specify which. There are in the herbarium of the California Academy about thirty species from that region, none of which seem to be circumscissile, though it must be confessed that several of them are too young to admit of certainty.

If Montia and Claytonia are both to be maintained, it must be on the lines laid down by Mr. Howell—all 3-ovuled species remanded to the first, and those with 6 ovules retained in Claytonia. The character is a slight one, but is assisted somewhat by the habit.

The annual Calandrinias are probably none of them natives of North America. All the forms of *C. Menziesii* appear to be represented by Chilian species; *C. Breweri* is inseparable, at least in our herbarium specimens, from *C. compressa* Schrad., and *C. maritima* belongs to the *picta* group, from some of which, in our herbarium, it is distinguished with sufficient difficulty. It often shows the replum-like threads separating from the margins of the valves so characteristic of *Talinum parvifolium*.

If *Talinum humile* had been known to Fenzl his opinion of the relationship of Portulacaceæ to Ficoideæ would have been materially strengthened. *T. humile* has a 3-celled and loculicidally dehiscent capsule, reminding of Mollugo. The septa are however very thin and traces of similar structure in the form of central vertical folds on the valves are to be found in various species of Talinum, in *Calandrinia maritima*, *Claytonia Chamissonis*, *Montia fontana*, etc.

It is well known that seeds are viable before maturity.

EXPLANATION OF PLATE.

Lewisia Kelloggii, whole plant.
A. Ovary opened, showing the upward splitting.
B. C. Stamens.
D. E. Petals.
F. Pedicel and calyx above the joint.
G. Leaf.
H. Embryo seen from within.
I. Embryo seen from the side.
J. Seed.

SECOND REPORT ON SOME HYMENOPTERA FROM LOWER CALIFORNIA, MEXICO.

BY WILLIAM J. FOX.

Through the courtesy of Dr. H. W. Harkness I have had the opportunity of examining another collection of Hymenoptera made by Dr. Gustav Eisen in the Cape Region of Lower California.

The collection is much larger than the one previously reported on, and, as may be expected, contains numerous species not before recorded from that region. Probably the most interesting accession to the fauna of Lower California is the discovery of a new species of Oxæa, a genus which has heretofore been restricted to South America, and to which no species has been added since 1865, when Sichel published a monograph of the genus. As far as the Hymenoptera are concerned, the fauna is more closely related to that of the southern part of California proper, Arizona and New Mexico, than it is to that of Mexico, and it is not until the extreme southern end of the peninsula is reached, which is included in the Torrid Zone, do the Mexican species show themselves to any ex-

MUTILLIDÆ.

SPHÆROPHTHALMA SACKENII Cress. San José del Cabo, October. Three ♂ specimens.

SPHÆROPTHALMA MAGNA Cress. San José del Cabo, October; west side of El Taste, September; Mesa Verde, October. Eighteen specimens, sixteen of which are from the first mentioned locality, which seems to denote that the species is more abundant in the warmer part of the peninsula and that its true home is in the tropics. In distribution this species ranges into California and Nevada. The specimens before me show great variation in size, 13–25 mm.

SPHÆROPHTHALMA GLORIOSA Sauss. San José del Cabo and Mesa Verde, October. Numerous specimens.

SPHÆROPHTHALMA FERRUGINEA Sm. A specimen from San José del Cabo, October, I feel obliged to refer to this species, although in Smith's decription there is no mention made of the pale golden pubescence on second abdominal segment; otherwise the specimen fits the description well.

SPHÆROPHTHALMA ZAPOTECA Bl. One specimen. San José del Cabo, October.

SPHÆROPHTHALMA ERECTA n. sp.

♀.—Ferrugineus; clothed with sparse, long, erect, black hair; mandibles at tip, tibiæ and tarsi, and apical margin of first and second abdominal segments slightly, blackish; pubescence of cheeks and abdomen beneath, pale: in certain lights there is seen an appressed, silvery pubescence on the dorsal segments of abdomen; on the basal portion of the second dorsal abdominal segment there are two longitudinally parallel, elongate, yellowish marks, and on the apical portion there are two similarly colored, semiovate spots. Head very large, much wider than the thorax; deeply punctured, the cheeks not armed beneath; third joint of antennæ longer than the three following joints united; thorax shaped somewhat like a fiddle, its lateral edge crenulated; above the thorax is coarsely punctured, the punctures becoming gradually larger posteriorly until they form shallow foveæ on the metathorax; sides of thorax glabrous; abdomen much more finely and closely punctured than the head and thorax; on the sides of the second dorsal segment and on the same segment ventrally the punctures are sparse; tibiæ with strong, reddish spines, their calcaria whitish; on the pleuræ over the four hind coxæ there is a large patch of silvery pile. Length, 9 mm.

West side of El Taste, September. Is related, though not closely, to *S. canadensis*, *contumax*, *chiapa*, *cruciata* and *petricola*.

SPHÆROPATHALMA SCABER n. sp.

♀.—Black, clothed above with dense pale ochraceous pubescence; cheeks, thorax on sides and beneath, abdomen ventrally and the legs with a much sparser and paler pubescence, through which the black ground color shows

PHOTOPSIS NEBULOSUS Bl. El Chinche, September. El Taste, 3,400 feet. Five specimens.

PHOTOPSIS MELLIPES Bl. El Chinche, September. El Taste, 3,400 feet. Two specimens.

PHOTOPSIS MELICAUSA Bl. Four specimens. El Chinche, September. El Taste, 3,400 feet. One specimen differs from the typical form by having the greater part of the four hind femora and the second abdominal segment, laterally, black.

PHOTOPSIS sp. A small species related to *P. clara* Bl., from which it differs by the finer sculpture of head. San José del Cabo, October.

BRACHYCISTIS CASTANEUS Cress. San José del Cabo, October. El Taste, 3,400 feet. Eight specimens. Rather small for this species, 10–12 mm.

SCOLIIDÆ.

MYZINE CONFLUENS Cress. Five ♀ specimens. San José del Cabo, October.

MYZINE TOLUCA Cam. Two ♀ specimens. San José del Cabo, October.

MYZINE HAMATA Say. El Taste, 3,400 feet. Eight ♀ specimens, which I refer to this species. They differ but little from specimens from the Eastern United States.

MYZINE HYALINA Cress. San José del Cabo, October. Seven ♂ specimens.

MYZINE spp. Two species, from San José del Cabo, that I am unable to identify.

TIPHIA sp. El Taste, 3,400 feet. A single specimen, perhaps a new species, evidently related to *trichiosoma* Cam., and *intricata* Sm., but seems to be distinct from both.

PARATIPHIA ÆQUALIS n. sp.

♀.—Head with large, deep punctures, sparser on the vertex, finer and closer on the cheeks; front before the ocelli smooth and glabrous; clypeus rounded anteriorly; flagellum stout, the first joint slightly shorter than the second; scape strongly punctured and bearing white hair; ocelli placed in pits; prothorax above, except hind margin, with coarse, somewhat confluent punctures; dorsulum with large scattered punctures, the lateral impressions deep; scutellum and postscutellum punctured like the dorsulum, the scutellum strongly impressed medially; metathorax above finely shagreened, and at the apex with some strong folds or rugæ, the posterior face more strongly shagreened and indistinctly punctured; propleuræ strongly punctured, sparsely so on lower portion; metapleuræ with coarse striations; spines of tibiæ and tarsi reddish testaceous, the calcaria white; first and second dorsal abdominal segments about equally punctured, the second ventral a little more strongly so; the remaining segments more closely punctured; last dorsal segment, except apical portion, coarsely roughened. Black; head, is finely punctured, and just behind them, on the verge of the truncation, there is a transverse row of similar foveæ extending from side to side; propleuræ punctured, with some striations on lower portion, the metapleuræ coarsely striated; the abdomen punctured similarly as in the ♀; last dorsal segment strongly carinated medially. Length 9–11 mm.

San José del Cabo, October; El Chinche, September. Nine specimens. The black clypeus of ♂ and color of wings of ♀ will separate it from *albilabris*. The wings of ♀ are subfuscous, with the nervures and stigma black. In the ♂ they are subhyaline, with a fuscous stain at tip of marginal cell. The punctation of abdomen will separate it from *Paratiphia (Epomidiopteron) Smithii* Cam.

SCOLIA BADIA Sauss. El Taste, on the west side, September, and 3,400 feet. San José del Cabo, October. The ♂, which has hitherto been undescribed, is colored like the ♀, except that the vertex, scape and greater part of dorsulum are black; sometimes the dorsulum is entirely black.

SCOLIA LECONTEI Cress. Three specimens. San José del Cabo, October. One specimen lacks the yellow on scutellum and first and second abdominal segment, and the yellow on pronotum is reduced to two small spots on anterior portion.

SCOLIA CONSORS Sauss. One specimen. San José del Cabo, October.

SCOLIA RIDINGSII Cress. San José del Cabo, October. There exists a remarkable similarity between this species and *Elis xantiana* ♀. The ground color and markings are almost exactly the same, and at a first glance these species would be taken to be one and the same.

Elis xantiana Sauss. San José del Cabo, October, and El Taste, 3,400 feet. Numerous specimens. The males appear to be much commoner than the females.

Elis dorsata Fab. (*tolteca* Sauss.) Numerous specimens. San José del Cabo, October, and El Chinche, September.

Elis trifasciata Fab. I refer to this species, with some doubt, six male specimens from San José del Cabo.

POMPILIDÆ.

Pompilus æthiops Cress. El Taste, 3,400 feet. One ♀ specimen.

Pompilus porus n. sp.

♀.—Clypeus rounded anteriorly; front with a faintly impressed line from lower ocellus to base of antennæ; hind ocelli separated from each other by a greater distance than they are from the nearest eye-margin; antennæ slender, the first joint of the flagellum much longer than the second; eyes converging towards the vertex; posterior margin of prothorax arcuate; metathorax rounded behind, not impressed; tibiæ and tarsi strongly rowed at the top, receiving the recurrent nervure a little beyond the middle; the cheeks possess some long white hairs. Length, 9 mm.

♂.—Differs from the ♀ by the short, stout antennæ, the first joint of flagellum being but little longer than the second, by the white calcaria and spines of tibiæ and tarsi, and by having the base of the third and the last dorsal segment entirely, whitish; only the apical part of the hind femora and basal half or two-thirds of their tibiæ, reddish. Length, 7 mm.

San José del Cabo, October. Three specimens. Closely related to *posterus* Fox and *exactus* Cam. From the former it differs by the lesser distance between the eyes at the top and the narrower third submarginal cell; from the latter species it differs chiefly by the hind ocelli being more widely separated from each other than they are from the nearest eye-margin; and moreover the four anterior legs are black. The ♂ is evidently the "small form" mentioned by Cameron under the description of *exactus*.

POMPILUS CORUSCUS var. JUXTA Cress. Five ♀ and 3 ♂ specimens. San José del Cabo, October.

POMPILUS INTERRUPTUS Say. San José Cabo, October. One ♂ specimen. The coloration of this specimen agrees better with the description *P. balteatus* Cam., than *interruptus*, but the fore margin of clypeus is not incurved.

POMPILUS ÆQUUS n. sp.

♀.—Bluish-black; clypeus black, planate, finely and sparsely punctured, subtruncate anteriorly; just above the base of antennæ there is a short longitudinal impressed line; eyes, if anything, slightly diverge towards the vertex; hind ocelli separated from each other by a distinctly shorter distance than they are from the nearest eye-margin; first joint of flagellum distinctly longer than the second; scape shining, punctured, in length about equal to the pedicellum and first joint of flagellum united; prothorax long, rounded at the sides anteriorly; metapleuræ and the lateral part of posterior face of metathorax, with coarse, transverse striations, the metanotum without striæ and on its apical part with a medial impression; legs darker than the thorax, tibiæ and tarsi tolerably well spined; fore tarsi without comb, although there is a row of very short spines on the first joint; longer spur of hind tibiæ equalling less than one-third the length of the first hind tarsal joint; wings blue-black, darker at the apex; length of the second and third submarginal cells at the top about equal, second recurrent nervure received in the middle of the third submarginal cell; abdomen half again as long as the head and thorax, compressed apically, last segment sparsely clothed with black hairs. Length, 17 mm.

El Taste, 3,400 feet. Related to *macronotum* Kohl and *lævifrons* Cress., from both of which it differs by the first joint of flagellum being longer than the second; from

PEPSIS RUBRA Drury. About forty specimens of this common and widely distributed species. San José del Cabo and Todos Santos, October. El Taste, 3,400 feet. The series before me shows considerable variation, some lack the white tip to wings, and in several males the fulvous is confined to the central part of the wing. One ♀ specimen measures but 21 mm.

PEPSIS HESPERIÆ Patt. One ♂ specimen. West side of El Taste. This species seems to be closely allied to *P. Andrei* Mocs., to which species I had at first referred the specimen.

MYGNIMIA sp. El Taste, 3,400 feet. A specimen that differs only from *ustulatus* by the distance between the hind ocelli and the eyes being about twice greater than the space between them.

SPHECIDÆ.

AMMOPHILA QUADRIDENTATA Cam. West side of El Taste, September. One specimen.

AMMOPHILA SÆVA Sm. El Taste, 3,400 feet. One specimen. *A. striolata* Cam., seems to be very close to, if not identical with, this species.

AMMOPHILA MACRA ? Cress. Three ♂ specimens from El Taste, 3,400 feet, that differ somewhat from *macra*. They may represent the ♂ of *sæva*.

AMMOPHILA PRUINOSA Cress. San José del Cabo, October. Seven specimens.

AMMOPHILA YARROWI Cress. Numerous specimens. San José del Cabo, October. The ♀ is larger than the ♂, the thorax more densely pruinose, the red on legs and abdomen brighter and more extended.

AMMOPHILA sp. Eight ♀ and nine ♂ specimens of a species that I cannot place. San José del Cabo, October.

AMMOPHILA FEMUR-RUBRA n. sp.

♀.—Clypeus depressed in the middle anteriorly, with rather strong separated punctures on fore portion, its anterior margin slightly incurved medially; front and vertex very finely and closely punctured, the former deeply channeled down the middle; vertex a little depressed on each side of the hind ocelli; space between the hind ocelli much less than the distance separating them from the nearest eye margin; first joint of flagellum about equal to the length of the two following joints united; prothorax and dorsulum strongly impressed down the middle, with a rather indistinct punctation; scutellum longitudinally striated on apical half, impressed; sides of metanotum with longitudinally oblique striations, those in the inclosed space transversely oblique; propleuræ indistinctly striated below; mesopleuræ sparsely punctured; petiole of abdomen composed of two segments. Black; abdomen, except spot at the base of second segment of petiole, large spot on third and fourth and the dorsal and ventral apical segments, pale red; all the femora, except a black line on top the anterior and posterior, also red (sometimes the

SPHEX PENNSYLVANICUS Linné. I refer to this species a ♂ specimen from El Taste, 3,400 feet, which differs from the typical form by being slightly stouter and by having the reflection of wings bluer.

SPHEX LUCÆ Sauss. West side of El Taste, September: San José del Cabo, October. Three males. These specimens are entirely black, except the first two or three abdominal segments on the extreme sides, which are rufo-testaceous.

SPHEX HABENA Say. San José del Cabo, October. Three specimens. *S. spiniger* Kohl, from Mexico and Brazil, is very likely synonomous with this species.

SPHEX DUBITATA Cress. One specimen. Same locality as the preceding.

SPHEX *(Isodontia)* ELEGANS Sm. Three specimens. Same locality as the preceding.

SCELIPHRON *(Chalybion)* ZIMMERMANNI Dhb. Four specimens. San José del Cabo, October.

SPHECIUS CONVALLIS Patt. (=*raptor* Hdl.)

Stizus grandis Pack., Proc. Ent. Soc. Phila., vi, p. 442.

Sphecius speciosus var. *convallis* Patt., Bull. U. S. Geol. Survey, p. 342, 1880. ♀ ♂.

Sphecius raptor Handl., Sitzb. d. k. Akad. der Wissensch. Wien. Mathem.-naturw. Classe, xcviii, p. 461.

Three female specimens. San José del Cabo, October. Why Handlirsch renames this insect *raptor* when it already possessed a name, given by Patton, which required but elevation to specific rank, he does not state, and as there seems to be no reason that Patton's name should be placed in the synonomy, it is but just to give the credit to the latter author.

BEMBEX OCCIDENTALIS Fox. San José del Cabo, October. Twelve specimens. One specimen, a ♂, lacks the yellow marks of the center of dorsulum, and the markings on metanotum.

Bembex monodonta Say. Three specimens. San José del Cabo, October.

Monedula speciosa Cr. Two specimens. San José del Cabo, October.

Bembidula variegata Oliv. San José del Cabo, October. Three specimens.

Steniolia duplicata Prov. San José del Cabo, July and October.

Stizus Godmani Cam. (=*agilis* Cam. non Sm.) Numerous specimens, 28 ♀, 1 ♂. San José del Cabo, July and October; El Taste, 3,400 feet.

Stizus flavus Cam. El Taste, 3,400 feet; San José del Cabo, October. Nine specimens. This species occurs also in New Mexico and Colorado.

Stizus lineatus Cam. San José del Cabo, October. Two specimens. Resembles *flavus* greatly, but the thorax is less yellow, the legs slenderer, and the space between the eyes at the clypeus narrower.

TACHYTES sp. One ♂, related to *sericatus* Cress. San José del Cabo, October.

TACHYTES EXORNATUS Fox.

In a paper on the North American Larridæ,* I described a new species of *Tachytes* from New Mexico, based on a ♂. There are before me three females from San José del Cabo, October, and El Taste 3,400 feet, that evidently belong to this species. They may be characterized as follows:

♀.—Black; the legs, except coxæ and trochanters, and the abdomen red, except a blotch on the third dorsal abdominal segment, the fourth and fifth dorsals entirely, and spots or blotches on the ventral segments, all of which are black; basal half of mandibles, spot at apex of scape beneath and the tegulæ, also reddish; head in front, dorsulum, especially on sides, mesopleuræ, with pale golden pubescence, that on the other parts of the thorax and on the occiput, grayish; cheeks, legs more or less and the apical margin of dorsal abdominal segments 1–4, with silvery pile, that on the pygidium golden; wings yellowish, iridescent, dusky at apex; nervures reddish testaceous. Anterior margin of clypeus somewhat rounded-out and armed with two teeth on each extreme side; space between the eyes at the top less than the length of antennal joints 2 and 3 united; first joint of flagellum scarcely one-quarter longer than the second; scutellum not impressed; metanotum not furrowed, the fovea at apex distinct; tibiæ and tarsi strongly spinose; longer spur of hind tibiæ slightly longer than the first joint of hind tarsi; ventral abdominal segments 3–6 sparsely punctured, and segments 2–5 with a transverse row of bristles before their apices. Length 18–19 mm.

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* Proceedings of the Acad. Nat. Sciences, Phila., 1893, pt. 3.

TACHYSPHEX TARSATUS Say. One ♀. San José del Cabo, October.

ASTATUS BICOLOR Say. One ♀. Same locality as preceding.

GORYTES SPILOPTERUS Handl. San José del Cabo, October. One specimen.

GORYTES sp. San José del Cabo, October. One ♂, related to *hamatus* Hdl. and may be the ♂ of *punctifrons* Cam., from Mexico, a species that is said to be allied to *hamatus*, and of which only the ♀ is known.

CERCERIS spp. There are in the collection three species of this genus, none of which I have been able to identify. All are from San José del Cabo, October.

PHILANTHUS VENTILABRIS Fab. (♂ = *frontalis*.) A variety of this species, red, with the usual yellow markings, is represented by a single ♂ specimen from San José del Cabo, October.

APHILANTHOPS HISPIDUS n. sp.

♂.—Black; the head, thorax, femora and first segment of abdomen densely clothed with long, whitish hair, hind femora above, all the tibiæ at base and on outer side, spot on each side of first abdominal segment, which is (the spot) drawn out into a point within, fascia on apical part of segments 2–6, that on the second interrupted medially, on the third very nearly interrupted, the fourth and fifth emarginate on each side anteriorly, sixth indistinct, and spot on each side of second and third ventral segments, all pale yellow, or whitish; wings subhyaline, darker towards apex, nervures black, stigma testaceous. Length, 13 mm. San José del Cabo, October.

OXYBELUS VENTRALIS n. sp.

♀.—Produced medial part of clypeus anteriorly with a large tooth laterally and slightly produced in the middle; there is also a strong tubercle or production on the clypeus near the base; front and cheeks with strong, separated punctures, the vertex more strongly punctured and without a tubercle behind the ocelli; eyes converging a little towards the vertex; dorsulum as strongly punctured as the vertex, at the apex, just before the scutellum, there is a transverse row of elongated foveæ; scutellum sharply carinated and with the punctures stronger; spine ending in sharp point, the squama terminating in a curved spine; base of metathorax with radiating ridges, the posterior surface roughly punctured and with the usual carinæ; metapleuræ irregularly striated; mesopleuræ with large, scattered punctures, which are more or less connected by some coarse striæ; abdomen coarsely punctured especially the first segment. Black; head clothed with silvery pubescence, particularly the lower part of the cheeks; dorsulum with a short, pale fuscous pubescence; flagellum beneath, fore tibiæ in front, and the tarsi reddish testaceous; basal half of mandibles, tubercles, outer margin of tegulæ, two spots or pronotum above mesosternum, all the coxæ beneath, spot at base of the tibiæ, on the anterior pair drawn out into a line, anterior and middle femora beneath, large spot on each side of first dorsal abdominal segment, narrow line at apex of the remainder interrupted medially, apical margin of second ventral and greater part of ventral segments 3–5, white; wings subhyaline. Length, 10 mm.

San José del Cabo, October. Related to *cornutus* Rob., but lacks the tubercle on vertex, the punctuation is decidedly stronger and the markings are white.

CRABRO IMBUTUS n. sp.

♀.—Clypeus strongly carinated, the produced medial portion with its fore margin subtruncate; head finely and closely punctured, finer on the cheeks, and sparsely clothed with long, pale-brownish hair; frontal depression distinct; on each side of it and the median lobe of clypeus with a pale golden pubescence, that on the lateral clypeal lobes and the cheeks, silvery; hind ocelli separated from each other by a much less distance than they are from the eye-margin, the fore ocellus separated from the posteriors by about half the distance that separates them; from the fore ocellus there is a distinct, though not strong strongly so on apical portion, the remaining dorsal segments very compactly punctured, the dorsal segments sparsely so; pygidial area long, much narrowed apically, depressed and coarsely punctured. Black; tegulæ, trochanters and femora, except apex and the fore pair beneath, reddish; basal half of mandibles, scape, pronotum above, tubercles, elongate mark on episternum of the mesothorax, two spots before scutellum, fore margin of the latter, postscutellum, fore femora beneath, apex of femora, tibiæ, tarsi (obscurely), a somewhat drepaniform mark on each side of first dorsal segment, two large elongato-triangular ones on central part of second, nearly meeting in the middle, a broad band, narrowed medially, on middle portion of 3–5, sides of the sixth, and a band on ventrals 2–5, all bright yellow; thorax very sparsely clothed with pale hair; wings yellowish, fuscous on apical third, stigma and costal nervures reddish-testaceous. Length 13½ mm.

San José del Cabo, October. Related to *C. sonorensis* Cameron.

EUMENIDÆ.

EUMENES PEDALIS n. sp.

♀.—Clypeus convex, with strong, scattered punctures notched anteriorly, the teeth not very prominent and flattened; head coarsely and closely punctured, most strongly so just before the ocelli, and more sparsely in the emargination of the eyes; thorax coarsely and closely punctured; metathorax presenting two strong convexities, coarsely and confluently punctured; petiole of abdomen much widened apically, sparsely and strong punctured, the broadening beginning at a distance from the base that is equal to about one-quarter of the length of the petiole, the apical margin thickened and the apical half is strongly furrowed down the middle; punctures of second segment finer than those of the petiole, sparse on anterior portion and very close and still finer on apical portion, the apical margin greatly thickened; petiole beneath with stronger punctures than above. Black, including the scape entirely; tegulæ, apex of femora and tibiæ and tarsi, dull red; basal third of clypeus, spot above the antennæ, small spot on posterior orbits, line, narrowed medially, on fore margin of prothorax, spot beneath tegulæ, postscutellum, spot at top of each convexity of the metathorax, apical margins of the first to fourth abdominal segment, small spot on each side of petiole just behind the middle, and an elongate mark on each side of the second segment, all yellow; head and thorax rather densely clothed with pale fuscous pubescence; abdomen with sericeous pile; wings subhyaline, darker along the costa and in the marginal cell, nevures black. Length 14 mm.

♂.—Clypeal teeth prominent, triangular, the notch deeper; scape and antennal spine black; very similar to the ♀; clypeus entirely yellow; spots on metathorax small; marked otherwise as in the ♀; the middle femora above, in both sexes, at the apex, sometimes are yellow. Length 13 mm.

ODYNERUS ANORMIS Say. San Esteban, April (*Haines*). Two specimens. I refer doubtfully to this species another specimen from the same locality, which differs by the shallower punctation of the thorax.

ODYNERUS (*Ancistrocerus*) LACUNUS n. sp.

♀.—Clypeus strongly punctured, bicarinated anteriorly, and but slightly notched or incurved, nearly truncate, the teeth small; a strong keel between the antennæ; front with great punctures, those on the vertex more separated; between the hind ocelli are two elongate, widely separated, tubercles; thorax with great punctures; antero-lateral angles of prothorax sharp; postscutellum not crested; metathoracic excavation indistinctly striated, the upper part of metathorax coarsely punctured; abdomen strongly punctured, but much less so than the head and thorax, the punctures on first segment strongest and the transverse sulcus deep and wide, margins of the segments not reflexed; first segment nearly as wide as the second. Black; base of clypeus (sometimes broken into two spots), spot above the antennæ and in the eye-emargination, line on posterior orbits, scape beneath, two large spots on prothorax anteriorly, margin of tegulæ, spot beneath them, spot on dorsulum at apex, postscutellum, spot on each side of metathorax, apex of fore and medial femora, line on the tibiæ, apical margin of dorsal segments, 1, 2 and 4 and ventral segment 2, elongate mark on each side of first dorsal segment and a small dot on each side near the base of the second, all pale yellow: wings subhyaline, fuscous in the marginal cell, nervures black. Length, 9 mm.

♂.—Clypeus entirely, inner orbits as far as eye-emargination, greater part of tibiæ, tarsi except last two or three joints, pale yellow; no yellow on metathorax; flagellum beneath testaceous, though not always; otherwise as in ♀. Length, 7–9 mm.

San José del Cabo, October. Seven specimens. Related evidently to *Guzmani* and *occidentalis* Sauss.

ODYNERUS ACOHUUES Sauss. Seven specimens. San José del Cabo, October.

ODYNERUS ITURBIDI Sauss. West side of El Taste, September. One specimen, a female, which, although the ♂ only is described, seems to belong to this species. As I have not seen *O. Iturbidi* ♂, I am not sure that this specimen is properly assigned.

ODYNERUS (*Alastor*) MEXICANUS Sauss. San José del Cabo, October. Two specimens.

VESPIDÆ.

POLISTES BELLICOSUS Cr. One specimen. El Taste, 3,400 feet. This specimen lacks the two yellow lines on metathorax.

POLISTES spp. Two species, neither of which I can identify. They are very likely varieties of some described form.

POLISTES CARNIFEX Fab. San Esteban, April (*Haines*); El Taste, 3,400 feet. This is a variety differing in lack-

Cabo, October. Related to *femoralis* G., and may be the ♀ of *nasutus* Sm.

AUGOCHLORA spp. Three species of this difficult genus from various localities.

ANDRENA spp. Two species from Magdalena Island, collected by Haines, in March.

APIDÆ.

PANURGUS MANIFESTUS n. sp.

♀.—Black; large spot on clypeus and sides of face, yellow; head clothed with long pale pubescence, which is most dense on cheeks, and darker on occiput; labrum and mandibles fringed with brown pubescence; clypeus strongly and sparsely punctured, with a strong, transverse impression before the anterior margin, which gives the latter the appearance of being slightly reflexed; front and vertex with a compact punctuation, which makes them appear coarsely granulated; joints 4–7 of the flagellum beneath, pale testaceous, the first joint distinctly longer than the two following united; the dorsulum, scutellum and postscutellum are covered by a very short, dense, tawny-olive or raw umber pubescence, which completely hides these parts; pubescence on sides of thorax and legs colored somewhat like that of the front, or darker, on the legs it is darker and tinged with yellow; metathorax strongly and rather closely punctured, the enclosed basal portion with a fine transverse striation; tarsal claws cleft; abdomen finely and closely punctured, particularly above, the apical margins of all the segments with a fringe of pale pubescence, that on the fifth and sixth brownish and, more abundant; wings subhyaline, on apical third fuscous, nervures black. Length 12 mm.

♂.—Clypeus and sides of face colored and punctured as in the ♀; pubescence on head and thorax pale cinereous, and very sparse in comparison to the other sex; the pubescence on dorsulum, scutellum and postscutellum is by no means as dense as in the ♀, the punctation of these parts being visible; pubescence on legs very short and that on apical margins of segments not so prominent; wings as in the ♀. Length 9–10 mm.

Two ♀ and two ♂ specimens. El Taste, 3,400 feet. The large size and yellow markings of head will distinguish it. The ♂ bears some resemblance to a species of *Nomia*.

PANURGUS sp. A specimen from Magdalena Island (*Haines*), in poor condition.

CALLIOPSIS CONCINNUS n. sp.

♂.—Black; clypeus, sides of face, spot behind clypeus (not reaching as far above as the markings on sides of face), labrum, mandibles except apex, apex of femora, the tarsi except last joint, the four hind tibiæ at base and apex, the fore tibiæ likewise and also anteriorly, yellow; flagellum pale testaceous beneath, the first joint distinctly longer than the second; the antennæ long, when extended reaching beyond the tegulæ; face and clypeus ment this hair extends from one side to the other. Length, 6 mm.

El Chinche, September. Two specimens. Resembles greatly the ♂ of *C. pauper* Cr., but differs by the longer antennæ. It seems to be closely related to *C. citripes* Ashm., but differs from the description of that species in several characters.

CALLIOPSIS SCABER n. sp.

♀.—Robust; deep black, shining; a spot at the base of four anterior tibiæ yellow; head coarsely punctured; clypeus with a longitudinal, central impressed line; labrum with a depressed, smooth, enclosed space, which has a short keel reaching to about the middle; on the front near the orbits is a deep, short, impression or excavation; punctures of vertex coarser than those of the front; flagellum clavate, the first joint distinctly longer than the second; prothorax and tubercles bordered above with grayish pubescence or pile; dorsulum strongly and sparsely punctured, the scutellum and postscutellum much more closely so; enclosure at base of metathorax longitudinally ridged; just behind this enclosure the metathorax is smooth, but beyond this finely punctured; mesopleuræ with exceedingly coarse punctures; legs clothed with long, pale pubescence, especially the posteriors: wings subhyaline, iridescent, darker apically, nervures and stigma black, second submarginal cell slightly longer than the first; abdominal segments, except apical margin deeply punctured, more finely so ventrally; fifth dorsal segment on sides and apically and the sixth laterally with long, dense, pale pubescence, which is tinged with brownish. Length, 8 mm.

El Taste, 3,400 feet. One specimen. Related to *C. mexicanus* Cress., but differs by sparser punctuation of dorsulum, the impression on front near the orbits is shorter and deeper, and by the coarse sculpture of abdomen. It is very likely that what Cresson has described as the male of *mexicanus*, really does not belong to that species, but is on the contrary the ♂ of *scaber*, as it appears to be more closely related to the latter than to the former.

PERDITA VENTRALIS Fox. Magdalena Island (*Haines*), March. Numerous specimens, among which are several females, which sex is not described. Owing to an error, whether on my part or the printer's, in the original description the sex is marked ♀, when it should have been ♂.

♀.—Cheeks unarmed; frontal impressed line distinct, but not strong; mandibles medially, antennæ beneath, tibiæ, tarsi, apex of fore and posterior femora, tegulæ, the ventral abdominal segments entirely, and an irregular band on dorsal segments 2–5, emarginate behind and sometimes interrupted medially, all yellow, otherwise as in the ♂.

NOMADA sp. A specimen from San José del Cabo, July, which may be but a variety of *N. Krugii* Cress., from Porto Rico.

pubescence on thorax is grayish. Both species are from San José del Cabo.

MEGACHILE OCCIDENTALIS n. sp.

♂.—Black; flagellum beneath, tegulæ, apex of femora, apical half of tibiæ, and the tarsi entirely, reddish; sometimes the ventral segments of abdomen are more or less reddish; head in front densely clothed with long whitish pubescence, which becomes sparse on the vertex, where it is mixed with fuscous; vertex with tolerably strong, even, separated punctures, those on the front closer; clypeus strongly punctured, sparsely so medially, the anterior margin with a wide, medial emargination, on each side of which it is strongly produced; mandibles very broad and coarsely sculptured, and on outer margin near the apex drawn out into a triangular lobe, which is fringed with golden pubescence; antennæ rather long and slender, the last joint elongate-spatulate, and is decidedly longer than the preceding joint, second joint of flagellum nearly twice as long as the first; thorax clothed with whitish pubescence, densest beneath; dorsulum rather strongly and closely punctured, the punctures are, however, not confluent, and has two short, longitudinally parallel, patches of white hair basally, and another on its posterior portion, near the tegulæ; scutellum with the punctures somewhat stronger and sparser than those of the dorsulum, not impressed; anterior coxæ armed with a blunt, stout projection or tooth: the fore tarsi with the two basal joints dilated and within with a thick fringe of pure white pubescence; all the tarsi within are clothed with golden pubescence, particularly the hind pair, the other pubescence of legs colored like the thorax; wings subhyaline, slightly darker apically; abdomen above punctured about like the scutellum, except on fifth dorsal segment, and with a white band of hairs at apex of segments 1–4 and at base of segments 2–6; ventral segments 2–5 are densely clothed with white pubescence; sixth dorsal segment roundly notched at apex, the production on each side of the notch obtuse, the fifth dorsal segment laterally at the apex is armed with a tooth, which projects in such a manner as to appear attached to the base of the sixth segment. Length 12 mm.

Las Cruces, New Mexico (*T. D. A. Cockerell*); San Ignacio, L. Cal. (*Haines*) April. This is a very distinct species and belongs near *Sayii*, *pugnata* and *rufimanus*.

MELISSODES SUFFUSA Cr. San José del Cabo and Mesa Verde, October. One ♀ and one ♂ specimen.

MELISSODES MENUACHA (?) Cr. Numerous specimens of both sexes from several localities, that I refer doubtfully to this species. They either represent a variety or a distinct species, but their condition is such as to make a correct determination almost impossible.

MELISSODES spp. Four species in too poor a condition for identification.

DIADASIA APACHA Cr. Several specimens, both sexes. San José del Cabo, October.

Oxæa vagans n. sp.

♀.—Black; face, clypeus and cheeks with a sparse, pale pubescence; pubescence on vertex fuscous, that of the occiput long and pale; thorax above with dense, bright fulvous pubescence, much paler on the sides and beneath; legs with black or dark brown pubescence, except on the femora beneath and the hind tibiæ within, where it is long and pale; knee caps with short, golden pubescence; first and second dorsal segments at sides and first and second ventrals medially, with pale pubescence; the fifth dorsal has also at the sides pale pubescence, and medially black pubescence; ventral segments 2–5 at apex each with a band of pale pubescence, which is connected with the lateral pubescence; wings basally subhyaline, on apical half fuscous, with violaceous reflections, nervures dark testaceous; head with shallow punctures, those on the vertex stronger than those on the front, while on the clypeus the punctures are coarse and confluent; on the labrum the sculpture is coarser than on the clypeus, and the former has a longitudinal impressed line, or furrow; first joint of flagellum nearly as long as the five following joints united; pronotum above emarginate medially; sculpture of thorax hidden by the pubescence; abdomen deep black, with a slight iridescence on segments 2–4; dorsal segments 1–4 except apex, punctured rather sparsely. Length, 18–21 mm.

♂.—Eyes nearly touching on the vertex, being separated at that point by a distance that about equals the length of the twelfth antennal joint: last joint of flagellum obliquely truncate; labrum not coarsely punctured as in the ♀; pubescence on head, and sides of thorax apparently yellower than in the ♀; tarsi reddish, the legs clothed with a rather sparse, brown pubescence; no white pubescence on sides of abdomen, but the first dorsal segment at apex and the second at base, with whitish pubescence (this is worn off in one specimen), apical dorsal segment emarginate. Length, 19–21 mm.

El Taste, west side and at 3,400 feet; San José del Cabo, October; Cypress Mills, Texas (*Coll. G. B. Cresson*). This is the first species known to occur north of South America, and it is very distinct from the other described species by its non-metallic color of abdomen, and by the eyes approaching closely on the vertex. Its nearest ally is an undescribed species from Brazil in the collection of George B. Cresson, which differs from it by the entirely fuscous wings and in the coloration of pubescence.

XYLOCOPA VARIPUNCTA Patton. Three specimens. West side of El Taste,

XYLOCOPA ORPIFEX Sm. Ten ♀ and ♂ specimens. Comondu (*Haines*), March. El Taste, 3,400 feet.

XYLOCOPA sp. Twelve specimens of a large species that may be *ænipennis* DeG. San José del Cabo, October. Comondu (*Haines*), March.

EXOMALOPSIS PULCHELLA Cr. San José del Cabo,

Brachycistis glabrellus Cress.
Paratiphia albilabris Spin.
Pompilus tenebrosus Cr.
Pompilus connexus Fox *(nec Sm.)*
Planiceps concolor Sm.
Mygnimia mexicana Cr.
Sceliphron lucæ Sauss.
Sceliphron cæruleum L.
Ammophila varipes Cr.
Ammophila luctuosa Sm.
Monedula mammillata (?) Hdl.
Bembex lucæ Cress. MS.
Perdita sparsa Fox.
Perdita arcuata Fox.
Ericrocis rugosa Fox.
Anthidium californicum Cress.
Megachile pollicaris Cress.
Megachile exilis Cress.
Diadasia enavata Cress.
Diadasia diminuta Cress.
Xylocopa arizonensis Cress.
Centris lanosa Cress.
Apis mellifica L.

SOME PARASITIC HYMENOPTERA FROM LOWER CALIFORNIA.

BY WILLIAM H. ASHMEAD.

The following paper is based upon a small but interesting collection of parasitic Hymenoptera made by Messrs. Gustav Eisen and Charles D. Haines, in Lower California, Mexico, transmitted to me, to be worked up, by Mr. Wm. J. Fox, of the Philadelphia Academy of Sciences.

The specimens collected by Haines were taken in the spring of 1889 and those by Eisen in the fall of 1893. The collection comprised in all forty-four specimens, but these represented twenty-one distinct species, and several, as was to be expected, prove new to science.

Family PROCTOTRYPIDÆ.

ISOBRACHIUM Förster.

1. ISOBRACHIUM RUFIVENTRIS Ashm.

Monog. N. A. Proctotrypidæ, p. 38.

One ♂ specimen from El Chinche (Eisen).

Family BRACONIDÆ.

of mesonotum, scutellum, metathorax, mesopleura, mesopectus and abdomen red; head, antennæ, prothorax, lateral lobes of mesonotum, tegulæ, wings and legs, black. Head quadrate, the vertex smooth, the face rugose, sparsely pilose; palpi fuscous; antennæ a little shorter than body, tapering toward tips; the pronotum is crenated at sides; the mesonotum, except the posterior part of the middle lobe just in front of the scutellum, which is strongly transversely crenated, is smooth and shining; metathorax reticulated and with a median longitudinal carina; wings black, the recurrent nervure very nearly interstitial, the second submarginal cell only about two-thirds the length of the first; there is a white streak at the junction of the recurrent and first transverse cubital nervures.

Abdomen a little longer than the head and thorax united and a little broader than thorax; first segment reticulated with irregular sized punctures, the rugosities lineated toward apex; second segment with a large hexagonal, striated plate, the segment on each side of the plate rugoso-punctate; third segment with the basal two-thirds striated, the striæ becoming more or less obsolete toward the lateral margins; fourth segment at extreme base showing some very short striæ; otherwise, with the rest of the abdomen smooth, polished; ventral valve large, plow-share shaped.

Two ♀ specimens from San José del Cabo (Eisen).

Subfamily CHELONINÆ.

CHELONUS Jurine.

4. CHELONUS ALBOBASILARIS sp. n.

♂.—Length, 3 mm. Black, rugoso-punctate, faintly sericeous; trophi, more or less of legs, and basal one-third of abdomen, white; two basal joints of antennæ, rufous; all coxæ and the hind femora, black; anterior and middle femora more or less dusky above, as well as two or three apical tarsal joints; hind tibiæ at base and apex fuscous.

Antennæ as long as the body, 24-jointed, tapering toward tips; face finely rugulose, opaque; clypeus shining, finely and rather closely punctate; mandibles yellowish-white, with black teeth.

Thorax with the parapsides indicated by crenate punctures, the surface of the mesonotum before the scutellum very coarsely reticulated, but anteriorly and laterally it is smoother, punctate, with a slight lustre; scutellum on desk smooth, shining, with some microscopic punctures; pleura and metathorax very rugose, the latter truncate posteriorly, the superior edge carinated and the angles produced into a tooth; wings greyish-hyaline, with the nervures dark fuscous, the subcostal and median nervures yellowish.

Abdomen a little longer than the head and thorax united, not segmented, opaque, finely sericeous and very uniformly sculptured, the basal third of dorsum and the venter white; apex with a transverse fissure, containing a tubercle at the middle.

One ♂ specimen from El Chinche (Eisen). This

6. CREMNOPS LIBERATOR Brullé.

Agathis liberator Brullé, Hymen., iv, p. 502; Prov. Faun. Ent. du Can., ii, p. 523; Cress. Syn. N. A. Hym., p. 227.

One specimen from San José del Cabo (Eisen).

7. CREMNOPS MELANOPTERA sp. n.

♂.—Length, 6.5. Uniformly brownish-yellow, with the antennæ, wings, extreme tip of posterior tibiæ and hind tarsi, black; labrum dusky or black.

Body smooth, polished, thorax trilobed, the middle lobe with a crenate median grooved line, the metanotum with a broad crenated median furrow; wings with an irregular whitish spot in the first submarginal cell; areolet quadrate.

Described from one ♂ specimen from San José del Cabo (Eisen).

MICRODUS Nees.

8. MICRODUS SANCTUS Say.

Bassus sanctus Say., Bost. Jour. N. H., i, p. 249; Lec. Ed. Say., vol. ii, p. 703.

Microdus sanctus Cress., Syn. N. A. Hym., p. 227.

Nine ♂ specimens from San José del Cabo (Eisen).

9. MICRODUS MELANOPLEURUS sp. n.

♂.—Length 7 mm. Orange-red; head, trophi, pro- and mesopectus, mesopleura, metathorax, coxæ, trochanters, hind tibiæ and tarsi, and wings, black; ocelli white. Face finely punctate; vertex, thorax, except the metathorax, and abdomen smooth, impunctate, shining; metathorax rugose.

Described from one ♂ specimen from San José del Cabo (Eisen).

Family ICHNEUMONIDÆ.

Subfamily OPHIONINÆ.

THYREODON Brullé.

10. THYREODON FLAMMIPENNIS sp. n.

♀.—Length 23 mm. Black; wings bright fulvo-ferruginous, the tips margined with fuliginous, the hind pair with the anal area black; head and thorax opaque, closely punctate; scutellum, femora and abdomen shining.

Head transverse, a little narrower than the thorax with the face produced; eyes slightly emarginated within; face closely, evenly punctured, with a median carina extending from between base of antennæ, where it is highest, forward on to the clypeus, where it becomes obsolete; labrum produced; mandibles black, with two yellow spots more or less confluent at base; palpi black; antennæ extending to apex of petiole of abdomen.

Thorax without furrows, the scutellum deeply impressed at base and connected with the mesonotum by lateral carinæ, posteriorly rounded, shining, but still punctate; metathorax opaque, finely rugose, the posterior face with a slight median impression, but with no distinct carinæ.

Abdomen shining, much compressed, the segments after the third microscopically aciculated, but still shining.

Described from one ♀ specimen from El Taste, at an altitude of 3,400 feet (Eisen).

This is one of the most beautiful species yet discovered in this genus, and evidently mimics some of the spiderseparated from the face by rather deep oblique foveæ; labrum triangular, fimbriated; antennæ as long as the body or a little longer, the first flagellar joint much longer than the scape, pedicel and annular joints combined, or one-third longer than the second flagellar joint.

Thorax smooth, polished, at the most with sparse, microscopic punctures, only visible with a high power lens; scutellum tinged with yellow and with slight lateral carinæ, posteriorly rounded; metathorax and lower part of mesopleura closely punctate, the posterior face of metathorax bounded above by a delicate carina; wings with the second discoidal cell a little longer than the third, the discoidal nervure obtusely angularly bent, but without a trace of a process or stump of the cubital nervure.

Abdomen about 2½ times as long as the thorax, compressed, smooth, shining, clothed with a fine fulvous down, the petiole one-third longer than the second segment with the elliptic-shaped spiracles placed at two-thirds its length.

Described from one ♂ and two ♀ specimens from El Taste and one ♀ from El Chinche (Eisen).

12. OPHION sp.

One ♀ specimen (damaged) from San Esteban (Haines).

ENICOSPILUS Custis.

13. ENICOSPILUS sp.

One ♂ specimen from San José del Cabo (Eisen), unfortunately without abdomen and unfit for describing.

14. ENICOSPILUS sp.

One ♀ specimen from San Esteban (Haines), not in condition to be identified.

PANISCUS Gravenhorst.

15. PANISCUS (?) GEMINATUS Say.

Ophion geminatus Say, Lec. Ed. Say, i, p. 379.
Paniscus geminatus Say, Cress. Synopsis, p. 202.

Two ♀ specimens from San José del Cabo (Eisen). This is one of the forms which usually passes for this species, but which, I think, will probably prove a distinct species.

16. PANISCUS MEDIUS sp. n.

♀.—Length 12 mm.; ovip. 2 mm. Brownish-yellow; face and clypeus yellowish-white; ocelli large, prominent, the lateral touching the eye; eyes distinctly emarginate within; thorax smooth, trilobed; metanotum smooth, without a vestage of carinæ; wings hyaline, the costa and stigma brownish-yellow, the other nervures black, the discoidal nervure with a distinct stump of a vein; abdomen twice as long as the head and thorax united, strongly compressed, viewed from the side, not much broadened towards apex; the petiole is a little more than one-third longer than the second segment, with the spiracles placed at two-fifths its length, the second segment is about 2½ times as long as wide at apex.

Described from one ♀ specimen, from San Esteban (Haines).

This species resembles somewhat *P. texanus*, but is

ASTIPHROMMA Förster.

20. ASTIPHROMMA MEXICANUS sp. n.

♀.—Length 8 mm. Ferruginous, face yellowish; orbits to ocelli, mandibles, palpi, tegulæ and prosternum, whitish; antennæ slender, tapering toward tips and longer than the body; face finely punctate; metathorax distinctly regularly areolated; wings hyaline, the stigma and venation dark brown, the former with a white spot at base; abdomen about as long as the head and thorax together, compressed, polished, the petiole about one-fourth longer than the second segment, with a slight sulcus above; ovipositor not quite as long as the basal joint of hind tarsus, the sheaths stout or broad; claws pectinated.

Described from one ♀ specimen, from El Chinche (Eisen).

Subfamily CRYPTINÆ.

21. MESOSTENUS EISENII sp. n.

♀.—Length 9 mm; ovipositor not quite as long as the abdomen. Head, except anterior orbits, the clypeus and trophi, prothorax, except hind margin, and mesonotum, except lateral margins, black; antennal joints 8 to 12 above, anterior orbits, lateral margins of mesonotum, tegulæ and a short line beneath, white; basal two joints of antennæ, clypeus, trophi, scutellum and rest of the thorax and the abdomen, rufous.

Head and thorax punctate, the metathorax indistinctly areolated; wings subhyaline, the venation brown; abdomen slender, longer than the head and thorax united, highly polished, impunctate.

Described from a single ♀ specimen, from El Taste, 3,400 feet altitude (Eisen).

ON LAND AND FRESH WATER MOLLUSCA OF LOWER CALIFORNIA. No. 4.

BY J. G. COOPER.

A. The Region Explored.

In the autumn of 1893 Dr. G. Eisen made another collecting trip through that most tropical portion of Lower California lying south of the Tropic of Cancer. Having previously collected chiefly during the dry and colder months, it was intended to study the influences of the summer rains and heat on the animal and vegetable life of that region.

His work was under the auspices of the Academy of Sciences, and he was accompanied by Mr. and Mrs. Brandegee, as botanists.

They arrived at San José del Cabo September 5th, and were about two months in the field. Unfortunately, the season had been uncommonly dry, and there was only one heavy rain during their stay, about October 15th. The results of this dryness are apparent in the few additions made to land mollusca; but still there were many

The heights of camps given are not generally within several hundred feet of the summits, but are at the localities where shells were found living in most cases, while lower down there were more dead ones. As in this State, the occurrence of great numbers of shells on the surface, mostly dead, indicated that the annual production of young is quite limited, but that the shells have been accumulating for many years, while for many miles between such spots not one can be found. The whole collection was made within forty miles north of Cape St. Lucas, and some of the rarest of those distributed so sparingly by Xantus were found abundant only ten miles north of the Cape and a little over 2,000 feet above the sea. (Distances in straight lines.)

The following localities of camps were the most productive of land shells:

1. San José del Cabo and along the little permanent river for twenty miles northward to Santa Anita at a height of 300 feet, and near thirty miles N. N. E. of the Cape. (This place was before estimated at only 100 feet elevation.)

2. Sierra El Chinche, "Chinchbug Mountains," eight miles north of Cape (about latitude 23°), 2,000 feet altitude.

3. Sauzito, a few miles north and 3,200 feet high.

4. Sierra El Taste, "Meadow Mountains," eighteen miles north and 4,200 feet high.

5. Saltito, north of last and 3,200 feet high.

6. La Chuparosa (the Humming-bird) is a camp on the Sierra Laguna, and is near 6,000 feet altitude instead of 2,000, as before printed.

7. Sierra Laguna, about forty miles north, near the Tropic of Cancer, and put down by the U. S. Coast Survey map as 5,924 feet, though Dr. Eisen's barometer

made it 276 feet higher, and he thinks some peaks are over 7,000 feet.

None of these figures indicate the highest points of the peaks, only the camps.

The preceding are all along the central ridge of the peninsula, and the Coast Survey gives heights of two somewhat parallel ridges varying from 773 feet near Todos Santos Creek to 2,183 for the western, and 443 near Punta Arena to 4,419 further south on the eastern side of the peninsula.

This mountainous region extends about as far north as south of the tropic, which thus crosses the center of it. There the level suddenly falls to a low plain from 75 to 100 feet above the sea, extending clear across the peninsula, so that there is little doubt of the former existence of the southern region as a tropical island, about 100 miles long and 40 miles wide. From this isolation many peculiarities of the molluscan life may be expected, as compared with the more northern regions.

Sierra Laguna is named from the former existence of a lagoon somewhere on it, which is reported to have broken away its boundaries and become dry. There is not

B. BULIMULUS (PALLIDIOR?) VEGETUS AND ITS SUBSPECIES.

It has long been a doubtful question concerning two species (or forms) of this group, as to whether they were identical with two South American species (only differing as varieties at most), or were radically distinct and autochthonous.

The first American describers of species from the peninsula could find no specific differences, or else, considering the great variations in species of this group, did not venture to separate them on comparison with descriptions and typical specimens, although Dr. Gould at first considered his *B. vegetus* specifically distinct from *B. pallidior*. Still later, Binney and Bland described the lingual dentition of the Peruvian *B. pallidior*, and had means of comparing that of the peninsular allied form, but did not report any differences between them.

Since the expedition to the peninsula in 1891, Dr. W. H. Dall, to whom I sent living specimens of the so-called "*B. proteus* Broderip" from the mountains, has separated the peninsular shell from the South American, without giving any but external differences. It is not strange that without good and numerous Peruvian and Chilian examples we were compelled to agree with the older authors in uniting them, since even Dr. Dall, with numerous specimens from both regions, has not ventured to distinguish the peninsular *B. pallidior*. I am willing to agree to the distinctness of *B. montezuma* Dall, but for the sake of consistency must also contend that the other disputed form is also different in North and South America, the most northern having already been separated as *B. vegetus* Gould.

Still further to show the differences in the species of the unconnected geographical regions it may be stated that, to some extent, there are corresponding local variations in those of North and South America, probably caused by their environments, and not proving their identity. This is alluded to by Dr. Dall as " remarkably similar effects produced by similar environments acting upon plastic forms of the same genetic history." This can hardly apply to the very different climate, vegetation, etc., of Costa Rica, but may account for the similarities in the shells of North and South America.

In studying the variations in the forms of Bulimulus on the peninsula, anyone must be struck by the numerous characteristics of specific and even generic value which more or less connect them all, and yet divide them into groups so that they appear separable into divisions as extreme as almost one for each species. Still they are so linked together that similar characters of less importance connect shells of evidently distinct genera, and it becomes difficult to decide what to call specific and what generic. Further knowledge of the animals will probably unravel these difficult problems.

But now, as we look at characters of the shell alone, [redacted] this last collection a form connecting still more closely the *B. vegetus* with *B. montezuma*, which may be called either a white variety of the last or a rough variety of the first, the sculpture being as strongly shown. I have had this lithographed from a photograph, enlarged 15 diameters. The present forms, now called species, were probably much more closely connected when this region was an island.

C. SECTION LEPTOBYRSUS Crosse & Fischer.

These authors are followed by Dall in making this division of *Bulimulus* to include some species resembling *B. spirifer* Gabb, in having a more strongly twisted pillar in the upper part of the body-whorl, as in pl. v, fig. 4. Sometimes this has also a lamina more or less widely developed, which is continued to the mouth " as a fold or rounded ridge such as appears in the various species of subsection A." Now, under *B. sufflatus* Gould, Dall says: " In specimens which have survived a dry season attached to bark or stone the inside of the peristome and the space on the body between the two lips is often much thickened by a deposit of callus." I have also recorded this thickening and abnormal development of teeth in some island species, but attribute it to food and other causes.

I am of the opinion that the growth of the wide lamina in some specimens is also an abnormal deposit, and caused, perhaps, by irritation of the muscles used in holding up the shell when attached to a vertical surface of rock or tree. Even the extra twist of the pillar is explainable on the same principle like the divergent mouth, none of these characters being constant. I give a view of a shell with this pillar twist that in everything else is a *B. inscendens*, yet Dall would make it a "*B. bryanti*," according to his theory, on account of an abnormal and perhaps a pathological growth, putting it in a different section with a jaw-breaking name! It is a parallel to the occurrence of the lamina or "fulcrum" in some helicoid shells, developed from some unusual condition of the animal, but not constant. It is true that such characters may prove useful, and therefore in time develop into generic characters, but in cases like this I can only believe them to be pathological.

I have examined many specimens of the *inscendens* form without finding anything to warrant such a division of specimens by an internal and often hidden character, while they appear the same outside. Their variability is quite as great, if not greater, internally than externally, and few such variations are any more reliable as guides to the division into sections, genera, etc.

Dr. Dall considers the much enlarged figures given in the 3d article as "not characteristic"—probably because they are somewhat unlike specimens sent to him for the purpose of showing how much variation is to be expected in these shells. I have had figures engraved from photographs showing extreme forms as unlike the original types as can be found.

stock from which some others of this group have branched off, retaining some characters or acquiring others during their migrations. Among these are some exactly like Gould's *B. vegetus* from La Paz, and also some like the "*pallidior*" form. At first I thought some of them were *B. excelsus* Gld., and perhaps *B. spirifer* Gabb, with a tooth visible in the aperture, but I could find no twisted pillar nor flange inside.

BULIMULUS INSCENDENS W. G. B., and varieties.

From El Taste Mountains Eisen sent about fifty normal in form, seventy-four of var. *bryanti* and two of var. *beldingi*. Among them is every variety of size and smoothness, from a high polish to the roughness of *B. montezuma*, without any connection between these conditions; but Dr. Dall has named two more forms as var. *alta* Dall and var. *monticola* Dall, both of which I consider too unsettled to be of any value. Besides these, he has rather confused the subject by admitting my var. *bryanti* on p. 643, and then making some specimens which have internal laminæ a good species, on p. 645, under the same name.

BULIMULUS ARTEMISIA W. G. Binney.

This is one of the extremely aberrant species which Dr. Dall tries to force into § Leptobyrsus on account of "a faint elevated ridge far within the aperture." It might better rest in Peronæus until the animal is examined and compared with that of Columna. Dr. Eisen found it most abundant in the El Taste Mountains, obtaining about seventy between 3,400 and 4,200 feet elevation, but only one was fresh and seemed to contain the animal, though many had the curious epidermis unworn. This is shown in pl. vi, fig. 5, × 15 diameters, and the shell in pl. v, fig. 13. The specimens are all of the size of Binney's type, but the epidermis is not pale yellow, but chestnut-brown when fresh. This has also a beaded appearance, as shown enlarged in the figure. The little tubercles formed about 27 revolving rows on the body-whorl and 8 to 18 rows on the others, except the two nuclear, which have the usual vertical riblets. There appeared to be deciduous flakes of epidermis on the granulations before brushing them off. Inside of mouth when fresh, brown and shining, and some had a divergent mouth, as in *B. inscendens bryanti.* In most of them the lips are connected by a continuous callus, and in some it is raised, as in *Columna ramentosa*, but less everted and thickened, as well as more oval in form.

Three were found near Cape St. Lucas, which measure 0.86 to 1 inch long and 0.24 to 0.30 wide. Two of them are half bleached, but with some traces of epidermis on them, as well as sculpture.

In form and epidermis there is thus a remarkable resemblance between this shell and *Columna ramentosa*, especially to the subspecies *abbreviata*, as is shown on comparing fig. 17 with fig. 18 (which is magnified twice), var. *levis* to this, but it is probable that fresher specimens will show more of the sculpture of typical *xantusi*.

Of the late collection some are living, and these are strongly sculptured, as shown on pl. vi, fig. 29. (By an oversight, the revolving striæ are given as vertical in this and in fig. 28; the lines of growth crossing them are not shown strongly enough.) In dead specimens the epidermis and its granulations disappear from the surface of all these small species. In some the vertical growth-lines are the strongest, in others the revolving striæ.

The color of living shells is not yellow or pale brown and striped, as in var. *levis*, but uniform dark or chocolate brown. A small bleached shell from about 4,000 feet altitude, on El Taste Mountains, is very thin, translucent, and filled with granitic gravel, which explains its depauperate condition from absence of lime in the soil. Near Cape St. Lucas seventeen were found, bleached and smooth, at 2,000 feet elevation. The El Taste specimens measure 0.80 x 0.50 inch to 0.95 x 0.45. The nuclear whorls closely resemble those of the *Columna*.

Dr. Dall at first appears to have intended to make a new species of var. *levis*, but without fresher specimens than have yet been found this would not be safe. The differences from the type pointed out by me in article No. 2, p. 213, are that the epidermis has no cross-sculpture, though entire, which is analogous to the difference between the mountain form, *montezuma*, and its lowland representative, *vegetus*.

BULIMULUS BAILEYI Dall. (Correction.)

B. xantusi var. Stearns (in Catalogue?).

"Cape St. Lucas, W. J. Fisher and G. Eisen; Ortiz, Mex., V. Bailey; Guaymas, Mex., E. Palmer."

This shell probably belongs to Mexico only; certainly not to Cape St. Lucas. W. J. Fisher (now deceased) may have obtained it on one of the islands, but Xantus can scarcely have overlooked it, and Eisen informs me that he never was at Cape St. Lucas until 1893, and he got nothing like it there. The specimens found abundantly at Hermosillo, Mexico, by him, which I called a var. of *B. alternatus* Say, may possibly be referred to, but do not agree in every particular with the description.

BULIMULUS SUFFLATUS W. G. Binney.

Specimens of the young of this species much resemble *B. xantusi*, but have more swollen and obtuse whorls, the epidermis being also thinner and quite smooth, pale and shining. Numerous half-grown living specimens from El Taste Mountains, at about 3,200 feet altitude, have the thin alternately-striped epidermis entire, and vary largely in size of umbilicus. (See pl. v, fig. 11.) When larger, some examples are much more swollen than the typical *B. sufflatus*, and have only a few strips of epidermis left, as in fig. 9. Four dead, bleached shells from El Chinché Mountains, at 2,000 feet altitude, approach nearer to large *B. pilula*, and are evidently mature, with thickened lips. One is figured in fig. 10, and they may be

Taste Mountains, at about 4,200 feet, two more slender than the rest. Only one is fresh, and was probably alive when found. Both forms are represented double the natural size in pl. vi, figs. 18, 19, to show the extremes more " characteristically " than the former figures. The whorls in *abbreviata* vary from 8 to 9½. Fig. 31 shows how the sculpture on 3 whorls resembles that of *B. artemisia*, and under that species I have noted the remarkable similarity in the form of the shells, which extends to that of the nuclear whorls also.

MELANIELLA TASTENSIS n. sp. Plate vi, fig. 21.

Shell dextral, much elongated, white, translucent, nuclear whorls as in *M. eiseniana*, third less narrowed, sculpture nearly similar, whorls 14 to 16, longer and less oblique, 14 of them equaling 16 in that species. Outline of whorls flatter, mouth vertically longer, body-whorl not contracted, peristome not continuous, the lips being separated by the parietal wall about $\frac{1}{10}$ of an inch. Whole shell a fifth longer, with the same number of whorls.

Length 0.74 inch, breadth 0.08; mouth 0.10 long, 0.06 wide.*

Six only were found at Saltito Pass, just north of El Taste Mountains, at 3,200 feet altitude. In some the upper 6 or 7 whorls are much slenderer, proportionately, than the rest, as if they were starved when young, and often bent out of the straight course, as shown in figure.

Found under damp wood on the ground at the end of the wet (summer) season. Only two of them have 16 whorls, one 13, and three 11, these being immature.

Fig. 21 represents this species, and fig. 20 is *M. eiseniana*, given for comparison, both double the natural size. The figures of the latter, much enlarged, in vol. iii, 2d series, pl. xiii, give fuller details of form.

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*The breadth given for *M. eiseniana* as 0.14 is an error for 0.08.

Patula horni? Gabb.

One perfect specimen was found in Saltito Pass, 3,200 feet, measuring 0.15 inch wide; color dark brown. I supposed it might be a large *Hyalina diegoensis* Hemphill, until I detected the scattered bristles and coarser opaque shell. It is new to the peninsula, having been found only in southern Arizona before. Unfortunately, it was crushed by accident. Another, bleached and immature, occurred in a dead shell of Bulimulus.

Hyalinia indentata Say.

A few were also found on El Taste Mountains.

Planorbis (Anisus) anitensis J. G. Cooper.

About twenty specimens from Santa Anita (the only known locality) show a larger development of half a whorl more, measuring 0.30 inch wide. They are figured double natural size on pl. vi, figs. 22, 23.

The compressed sub-marginal line on right side is so faint in small ones that it was overlooked in the former figure, though described. In the new specimens there are also numerous more delicate revolving striæ, the outer whorl being also less flattened toward the mouth. The

EXPLANATION OF PLATES V, VI.

Figures 1 to 17 are of natural size.

Fig. 1. *Bulimulus regetus* var. *regexspiza*, showing the columellar thickening or tooth.

Fig. 2. Young of *B. regetus*, the upper translucent, the lower showing a slight angle on body-whorl.

Fig. 3. A toothed specimen like fig. 1, broken to show the normal form of pillar. Exactly the same is found in toothed *B. montezuma*.

Fig. 4. A typical *B. inscendens*, showing the pillar more twisted.

Fig. 5. *B. spirifer* from La Paz, showing the strong tooth inside where the lamina begins.

Fig. 6. A typical *B. inscendens* with a rudimentary tooth, more developed than in fig. 4.

Fig. 7. *B. inscendens* var. *alta* Dall, strongly sculptured, from Sierra Laguna.

Fig. 8. *B. inscendens bryanti*, the mountain form, called *monticola* Dall. These two have the pillar normal and no laminations.

Fig. 9. *B. sufflatus*, of largest size, having the epidermis only in a few narrow stripes.

Fig. 10. *B. sufflatus* var. *chinchensis*. An old thick-lipped specimen. Form near Binney's type.

Fig. 11. A half-grown *B. sufflatus*, with wide umbilicus, the epidermis entire.

Fig. 12. *B. pilula*, larger than type, from San José del Cabo.

Fig. 13. *B. xantusi*, typical form, El Taste Mountains.

Fig. 14. *B. xantusi levis* Dall (=*B. gabbi* var.?)

Figs. 15, 16. Forms of *B. xantusi?* from El Taste Mountains.

Fig. 17. *B. artemisia*, largest, from Sierra Laguna.

Figures 18 to 25 are double natural size.

Fig. 18. *Columna ramentosa abbreviata*.

Fig. 19. *Columna ramentosa*, typical.

Fig. 20. *Melaniella eiseniana*.

Fig. 21. *Melaniella tastensis*.

Figs. 22, 23. *Planorbis anitensis*.

Figs. 24, 25. *Planorbis peninsularis*.

Figures 26 to 31 are magnified 14 times.

Fig. 26. Surface of *Bulimulus montezuma* (white var.)

Fig. 27. " " *regetus regexspiza*.

Fig. 28. " " *inscendens bryanti (monticola)*.

Fig. 29. " " *xantusi* (typical), fresh specimen.

Fig. 30. " " *artemisia* " " "

Fig. 31. " *Columna ramentosa abbreviata*.

DESCRIPTION OF A NEW SPECIES OF RIBBON FISH, TRACHYPTERUS REX-SALMONORUM, FROM SAN FRANCISCO.

BY DAVID S. JORDAN AND CHARLES H. GILBERT.

Trachypterus rex-salmonorum, species nova. Plate ix.

=*Trachypterus altivelis* Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 52; and Synopsis Fishes of North America, 1882, 618; not of Kner.

Head $8\frac{1}{9}$ in length; cross depth at nape 8. Dorsal rays, V—170; caudal rays 8; ventral rays 6; pectoral 11. Total length of specimen, with caudal, 17 inches.

Body long and slender, closely compressed and ribbon-shaped, as usual in the genus. Head short, deeper than long, the anterior profile steep and nearly straight to the base of the nuchal crest; dorsal fin beginning on the top of the nuchal crest, which is directly over the second third of the diameter of the eye; height of crest slightly more than diameter of eye, the latter greater than length of snout and ⅓ length of head. Mouth oblique; maxillary rugose and very broad, its width ½ its length;

head; ventrals inserted just below axil of pectorals, filamentous, about half longer than head; pectorals ⅙ longer than eye; caudal rays simple to near tip, where is sometimes a single fork, the longest filamentous rays about three times length of head. Dorsal fin much lower than the body, the longest rays of the second dorsal nearly ⅔ length of head; a series of spinules along the base of the dorsal, one pair for each ray.

Lateral line well developed, with a series of small inconspicuous plates, each of which has a minute central prickle. Lower part of the body thickly beset with small spinous tubercles; rest of the skin naked; rays of all the fins accompanied by a series of small prickles.

Coloration everywhere bright metallic silvery, an oblong jet black blotch a little longer than the eye lying close along the base of the dorsal and beginning 1½ diameters of the eye behind the eye; three larger spots dusky but not black lying behind this along the side between the lateral line and the dorsal fin; two smaller dusky spots on the belly, the one just behind the base of the ventrals, the other under the second of the four spots of the back. These spots, except the first one mentioned, are all diffuse and are a little less than twice the diameter of the eye in length and about twice as long as deep. Anterior profile below crest, including front of snout and tip of mandible, jet black. Caudal and ventral fins carmine red in life; other fins unmarked.

This species bears some resemblance to *Trachypterus altivelis* described by Kner from Valparaiso. The latter species has, however, the nuchal crest much lower and farther back, the first dorsal and the ventrals much lower, the second dorsal fin higher, the skin rougher, the four black spots different in size and position from those found in our specimen, and the caudal rays divided near the base. It is probable that the three specimens of *Trachypterus* mentioned by us in the Synopsis of the Fishes of North America, page 619, and referred with doubt to *Trachypterus altivelis*, really belong to the present species. One of these specimens was taken at Santa Cruz, Cal., by Dr. C. L. Anderson, and presented to the United States National Museum; the other two were obtained in the Straits of Fuca by Mr. J. G. Swan, and were not preserved. According to Mr. Swan the species is known by the Makah Indians west of the Straits of Fuca as "King of the Salmon," and its destruction is believed to have a baneful influence on the salmon fishing.

The type of the present description was obtained by a fisherman in the open sea outside the bay of San Francisco. It is preserved in the museum of the Leland Stanford Jr. University, on the register of which it is numbered 1382. The specimen is in perfect condition.

DESCRIPTION OF A LITTLE KNOWN AGONOID FISH, HIPPOCEPHALUS JAPONICUS.

With Plate X.

BY FRANK CRAMER.

But two specimens of this little known species seem to have been previously recorded: one, picked up by Steller on the shore of one of the Kurile Islands in June, 1743; the second, secured by Tilesius in the Gulf of Patience, Island of Segalien, July 30, 1805. Steller's specimen, preserved in a dried condition, was forwarded to St. Petersburg to become the type of Pallas' *Cottus japonicus.* The second specimen, at first considered identical with *Cottus japonicus,* was afterwards separately described by Tilesius under the name *Agonus stegophthalmus.* Of the latter, Tilesius has left several descriptions and figures (see synonymy) which are unfortunately discordant in many of their details.

Subsequent writers have added little to the history of the species. The types of *japonicus* and *stegophthalmus* seem not to have been re-examined or compared, but Cuvier and Valenciennes, after a careful review of the published figures and descriptions, decided that *stegophthalmus* and *japonicus* were identical, and needlessly proposed for the species a new name, *superciliosus.* In 1839, *Aspidophorus superciliosus*, *Aspidophorus quadricornis* and *Agonus decagonus* were ranged by Swainson in a new genus, for which he proposed the name *Hippocephalus.* Needless to say, his generic characterization is worthless, and the three species therein included are not congeneric, *decagonus* belonging in fact in an entirely different part of the family. As the species *superciliosus* (= *japonicus*) is mentioned by Swainson first, it has been customary to consider it the type of the genus. Characterizations of the latter, based on current descriptions, have been attempted by Gill, and by Jordan and Gilbert.

A fine alcoholic specimen of this species is in the possession of the California Academy of Sciences, to which it was presented about 1882 by Dr. Krause of Berlin, Germany. This has been kindly loaned to the writer, and on it are based the following figures and descriptions. The specimen is 360 mm. long, and was obtained in the Okhotsk Sea.

Hippocephalus japonicus is most closely related to *Agonomalus proboscidalis* and *Hypsagonus quadricornis*. These three species are confined to the shores of the North Pacific Ocean and differ much more from the other members of the family than they do from each other. The group is distinguished by having the body compressed, the back elevated behind the nape, two rows of strong spines along each side of body, the spinous dorsal beginning immediately behind the nape with its spines strong and rough, the mouth terminal, and the branchiostegal membranes broadly united and free from the isthmus.

The genus *Hippocephalus* may be defined as fol-

Agonus japonicus Bloch & Schneider, Systema Ichthyologia, 105, 1801 (after Pallas).

Hippocephalus japonicus Jordan & Gilbert, Synopsis of the Fishes of North America, 723, 1883 (after Cuv. & Val.).

Agonus stegophthalmus Tilesius, "Mém. Soc. Nat. Moscow, ii, 219, 1809," and "Mém. Acad. Péters., iv, 427, plate 12, 1811;" Günther, Catalogue of Fishes, ii, 214, 1860 (copied).

Aspidophorus lisiza Lacépède, "Hist. Nat. des Poissons, iii, 1802."

Aspidophorus superciliosus Cuv. & Val., iv, 215, 1829.

Hippocephalus superciliosus Swainson, Nat. Hist. Fishes, etc., 272, 1839.

ETYMOLOGY—*japonicus;* supposed by Steller to be more common in Japan than where the type was found (Kurile Islands).

DIAGNOSIS—Body moderately slender, compressed, its width between the dorsals nearly two in the depth at the same place; two rows of strong and two rows of weaker spines along each side of body, and a median lateral row of spineless plates. Head, 4⅕.* Preopercular spine large, suborbital spine tubercular, supraocular ridge expanded into a triangular shelf projecting laterally far beyond eye and ending bluntly; no occipital spines. Back elevated behind nape. First dorsal short, beginning at the nape. Plates in the dorsal series, 43–45; between the dorsals (from last spine to first ray), 14 pairs (9 pairs between end of membrane of first dorsal and first ray of second dorsal). Nasal spines sharp, far apart, at tip of snout. No median rostral plate. Gill-membranes united, free from isthmus. Teeth in broad bands on the jaws and on vomer; none on palatines. The vent at a point between ⅓ and ¼ of the distance from ventrals to anal.

Color in spirits, "old ivory," with brown patches on the sides, one under first dorsal, one between dorsals, one under second dorsal, two or three on peduncle. B. 6; D. VI–7; A. 8; P. 12; V. 3 (1–2); C. 2–13–2.

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* The standard of length, when not otherwise stated, is the distance from the tip of the snout to the base of the caudal fin.

Description—The total length is 14½ inches. The body is compressed throughout, but the shoulder girdles are prominent, so that the width of the body at the base of the pectorals is a little more than the greatest height, and 5 in body length. Immediately behind the pectorals the width is a little less than the greatest height; between dorsals and on peduncle it is nearly two, and under second dorsal a little more than two in the height at the same points. Abdomen moderately swollen in front of vent. The back rises at an angle of 45° behind the occiput, slopes downward under first dorsal, leaving a hump under its front end, rises in front of second dorsal and slopes downward again under it. Ventral outline nearly straight.

The breast and the area between ventrals and vent are almost completely occupied by nearly flat, radially striated plates with slightly raised centers and of variable size, with innumerable excessively minute plates scattered among them. Vent surrounded by prickles. The plates of the ventro-lateral series are small, beginning as distinct rows of spinous plates about opposite vent, with an imperfect row of smaller spinous plates between them and the vent

37 plates in the inferior and 35 in the superior longitudinal row. Between them lies the median lateral series, bearing the lateral line, a nearly continuous row of 38–39 spineless plates extending from head to base of caudal (a few of them with small blunt tubercles). The dorsolateral series is composed of small indistinct plates from occiput to beyond middle of first dorsal, where they become larger and spinous. The plates of the sixth, seventh, eighth and ninth pairs behind the last ray of second dorsal are closely approximated, but do not form single median plates; from the ninth pair to the caudal the plates of the two rows alternate, as on the ventral surface. There are almost complete series of small plates, alternating with the large ones, between the dorso- and superior lateral series, between the superior and median lateral, between the median and inferior lateral and between the inferior and ventro-lateral series. This multiplication by intercalation of small plates is evident all over the body. There are no large but numerous minute plates in front of and on base of pectorals. Gill-membranes posteriorly and medially with several rather weak plates and many minute plates and prickles, anteriorly and laterally with a few small plates; under side of lower jaw with many imperfect plates or strong prickles; weaker prickles along the branchiostegal rays.

Head depressed throughout, narrow to the posterior border of the orbits, behind which it widens rapidly. Depth behind orbits 7/9 and over opercles ⅔ of the width at the same points. Orbits large, oval, 4½ in head, far forward. Interorbital space a little concave, very broad; at anterior border of orbits wider than the orbit itself, 3½ in head, at posterior border of orbit 2⅔ in head. Supraorbital ridges expanded into a flat triangular shelf projecting upward and outward over eye and ending bluntly. Occipital ridges heavy, low, spineless, forming low domes behind. The space between them concave. Preorbital with about two ridges radiating from the anterior border of orbit, each ending in a short, broad, plate-like, blunt spine. Suborbital with a broad dome-like tubercle. Preopercle with a dorso-ventrally compressed spine; below this 3 successively smaller blunt spines. Cheeks below orbit and suborbital with 4 or 5 fairly developed and many minute plates. Nasal spines far apart, near tip of snout, sharp, nearly upright.

A large membranous nasal tube. A short, flap-like barbel at tip of each maxillary. Mucous pores of lower jaw with flap-like borders. Mouth small, terminal; maxillary reaching a little beyond front of orbit. Angle of jaw, prominent, tubercular.

The dorsals are far apart, the first a short distance behind occiput; its spines very rough (like the rays of all the fins) with minute prickles or plates. Its leathery membrane also rough. Spines 6, transversely broad at the base, the fourth longest, 2 in head. Base of second dorsal about $1\frac{2}{5}$ in that of first dorsal; rays 7, the third longest, about $1\frac{1}{2}$ in head. Distance between dorsals of and under first dorsal, narrowing to the upper end of the base of the pectoral; another, of irregular outline, passing downward and forward to posterior side of base of pectoral; a larger one, mostly below the superior lateral series, behind first dorsal; one under second dorsal and three on peduncle, the last just in front of base of caudal.

Dorsal fins dusky, with small darker patches; first dorsal with an oblique pale bar near its base. Distal half of caudal dark, its tip edged with lighter. Posterior half of anal dusky. Pectorals marbled with yellowish and brown, the membrane of the distal one-third dusky, with paler edge. Ventrals pale. There are four or five brown spots on nape; a curved band of brown connecting the posterior ends of the occipital ridges, another between the latter and the temporal ridges, and a streak extending backward from posterior border of orbit. Brown areas on opercle and preopercle.

Distribution—Kurile Islands (Steller); Gulf of Patience, Island of Segalien (Tilesius); Okhotsk Sea (Dr. Krause).

DESCRIPTION OF A NEW WOOD-RAT FROM THE COAST RANGE OF CENTRAL CALIFORNIA.

BY W. W. PRICE.

Neotoma californica sp. nov. Plate xi.

Type No. 335, ♂ ad., Museum of the Leland Stanford Junior University. From Bear Valley, San Benito County, California, April 2, 1893. Collected by C. H. Gilbert and W. W. Price.

General Characters.—Closely related to *N. mexicana*, from which it differs in its darker, less fulvous coloration, its longer ears, and the cranial characters as given below. Tail densely haired, concealing the annuli, sharply bicolored. Ears very large. Throat ashy gray, the white confined to tip of hairs. Upper surface of feet pure white.

Measurements (taken in the flesh).—Total length, 336; tail vertebræ, 160; hind foot, 35; ear from crown, 34; ear from notch (dry skin), 25.

Color.—Upper parts yellowish-brown, darker on middle of back, becoming lighter but not brighter on the flanks, scantily clothed with appressed whitish hairs. In coloration this species differs from *N. mexicana* in having the purely white patches on the under side larger, the dusky element in the dorsal coloration more extensive, and the lighter element light yellow or buff, instead of deep fulvous or tawny.

Cranial characters.—In its cranial characters this species very closely resembles *N. mexicana*, with which it agrees in the broadly-rounded temporal region, the weakly-marked temporal ridges, the short, deep snout, with the nasal bones anteriorly produced and overlapping, and the very small auditory bullæ. The two agree also in shape of mandible, having a very slender, backwardly-curved coronoid process, and a narrow, acute-angled postcoronoid notch.

They differ in the following respects:

In *californica* the nasal processes of premaxillaries extend posteriorly to well beyond the nasal bones, while in *mexicana* they terminate evenly, or nearly so.

In *californica* the interparietal is longer (anteroposteriorly) in proportion to its width, with a strong posterior angle. In *mexicana* the posterior edge is evenly rounded, or nearly straight, without well-defined angle.

In *californica* the incisive foramina are short, 8.5 mm. in length. In *mexicana* they are unusually long, from 10 mm. to 11 mm. in specimens of equal size with the former.

Cranial Measurements.

Skull of type No. 335.

Basilar length of Hensel, 35.5 mm.
Greatest zygomatic breadth, 23. mm.
Least interorbital width, 5.5 mm.
Length of nasals, 16.3 mm.
Distance from incisors to incisive foramen, 3.8 mm.

Length of incisive foramen, 8.5 mm.
Length of rostrum from front of zygoma, 10.5 mm.
Height of rostrum in front of zygoma, 8. mm.
Length of base of upper molar series, 8.5 mm.
Distance between posterior molars, 4.5 mm.

In No. 1207, a specimen of *N. mexicana*,* from the Huachuca Mountains, Arizona, in which the basilar length is 36 mm., the measurements agree very exactly with the above, except in the longer nasals (18.5 mm.), the longer rostrum (11 mm.), the longer incisive foramen (10.5 mm.), and the distance separating latter from incisors (3 mm.).

The type specimen is adult, with the crowns of the molars ground down almost to the base of the plications.

Six specimens, besides the type, are in the University Museum, two from the same locality as the type, Bear Valley, San Benito County, and four collected by W. W. Price, on Mt. Hamilton, Santa Clara County, November 21 and 22, 1892. It is believed that all the specimens thus far obtained were living among rocks.

LIST OF SPECIMENS.

DESCRIPTION OF A NEW SPECIES OF WOOD-RAT FROM ARIZONA.

BY FLORA HARTLEY.

Neotoma albigula sp. nov. Plate xii.

Type No. 1336, ♀ ad., Museum of Leland Stanford Junior University. From the vicinity of Ft. Lowell, Arizona. Collected June 14, 1893, by W. W. Price and R. L. Wilbur.

General characters.—In size very similar to *Neotoma mexicana.* Tail densely haired, sharply bicolored; upper surface of feet pure white; throat, chest, middle line of belly and region between the hind legs pure white to the base of the hairs; other underparts grayish, the hairs white at tip and plumbeous at base.

Measurements (taken in the flesh).—Total length, 322; tail vertebræ, 158; hind foot, 32; ear (from crown), 26.

Color.—Upper parts pale yellowish-brown, much lined with black and with black-tipped hairs. On the sides the darker shades gradually disappear, leaving an almost pure light yellowish area along the line of separation from the white of the underparts; this yellowish streak is brightest on the flanks and in front of the shoulders. Throat, chest, median line of belly and patch between hind legs pure white, the color extending to the base of the hairs. The white area of the chest is continued out along the inner side of the fore legs. The other underparts are grayish-white in appearance, the hairs being broadly white at tip and dark plumbeous at base. The hind legs appear darker, owing to the narrowing of the white tips of the hairs. The yellowish-brown of the upper parts extends down on the outer side of the legs, stopping abruptly at the wrist and ankle, leaving the feet pure white. Ears clothed with brown and grayish hairs; whiskers mixed black and white, reaching to the shoulders; tail white below and on sides, the dark brown dorsal streak covering about one-third of its circumference.

Cranial characters.—Posterior process of the intermaxillaries extending well beyond the nasal bones, reaching to opposite the posterior part of the anterior upper molar; interparietal wide and not very long, with an evident posterior angle. Compared with *N. mexicana* and *N. californica*, the cranium is at once conspicuous by its much more inflated auditory bullæ. It has also a deeper snout, less projecting nasal bones, and deeper post-palatine notch. It agrees with *californica* in the characters separating the latter from *mexicana*, having short incisive foramina, backwardly-produced nasal processes of the intermaxillaries, and a decided posterior angle to the interparietal. The mandible is heavier and more strongly ridged than in either of the species just mentioned; the coronoid and condyloid processes are shorter and thicker, the latter hardly extending above the former, and the included notch is broadly rounded.

Cranial measurements of type, No. 1336.

N. albigula (No. 1336).	*N. mexicana* (No. 1308, Huachuca Mts., Ariz.).
Adult with no evident fulvous color.	Adult with evident fulvous.
Young, like adult in color, with belly almost pure white.	Young, blue-gray, with belly dark-gray, each hair with short white tip.
Throat, chest, median line of belly, and patch between hind legs with hairs pure white to base.	All underparts with the hairs plumbeous at base. (A few specimens have a small patch of hairs entirely white on the chest and between the hind legs.)
Posterior process of the intermaxillary extending several millimeters behind the nasals.	Posterior process of intermaxillary extending little if at all beyond the nasals.
Interparietal long and narrow, with an evident angle posteriorly.	Interparietal short and broad, without evident posterior angle.

LIST OF SPECIMENS.

Number of Specimen.	Sex.	LOCALITY, ARIZONA.	COLLECTOR.	DATE, 1893.	Total Length.	Length of Tail.	Length of Hind Foot.	Length of Ear.
215	♂	Ft. Lowell.	Price and Lunt.	Jan. 3.	320	144	33	
216	♂	"	"	"	325	142	34	
227	♂	"	"	Jan. 6.	322	154	32	
228	♂	"	"	"	320	152	34	
230	♂	"	"	Jan. 7.	322	155	32	
1200	♂	Fairbank.	Price and Wilbur.	Aug. 25.	313	109	34	26
1202	♀	Ft. Lowell.	"	June 17.	329	141	33	26
1204	♂	"	"	June 12.	314	151	34	25
1206	♂	Huachuca Mts.	"	July 26.	340	165	32	29
1304	♀	"	"	Aug. 5.	335	155	33	27
1309	♀	"	"	Aug. 3.	320	153	33	29
1313	♀	"	"	Aug. 4.	340	154	34	28
1315	♀	"	"	Aug. 7.	312	135	32	28
1317	♀	"	"	Aug. 4.	335	144	32	26
1320	♂	"	"	Aug. 1.	345	155	34	30
1337	♀	Ft. Lowell.	"	June 14.	332	158	32	26
1338	♂	"	"	June 13.	336	156	32	25

FORMICIDÆ OF LOWER CALIFORNIA, MEXICO.

BY THEO. PERGANDE.

Since the publication of my paper, published in these Proceedings* (pp. 26–36, ante), I have again received, through Mr. W. J. Fox of Philadelphia, another small collection of ants from Lower California, collected by Dr. Gustav Eisen, among which are some species not previously recorded from the peninsula of Lower California, and also several new forms, which will herewith be described. I hardly need to say that our knowledge of the Formicidæ of Lower California is still very limited, and that the material now available for study represents but a small fraction of the genera and species actually occurring in that interesting region.

FORMICIDÆ.

1. CAMPONOTUS SAYI Emery, subsp. BICOLOR, n. subsp.

☿ major: Length, 9–10 mm. Head, 2.8x2.6; scape, 2 mm.; post. fem., 2.6 mm.

Almost identical with the typical form, though larger and more robust. The head is somewhat longer and its posterior margin more deeply concave; the surface more highly polished; eyes smaller; anterior emargination of the clypeus broader and more distinct. Mandibles smoother, rather more highly polished, not striated or but very feebly so, and with fewer punctures. The sutures between thoracic segments are deeper, especially that between the meso- and metanotum; the mesonotum more elevated.

Colorotion as in *sayi*, though the head somewhat darker red.

☿ minor: Length, 3–7 mm. The head of this form is much narrower than in the ☿ major, particularly posteriorly, and comparatively longer than in *sayi;* the eyes are also smaller and less strongly projecting; the prothorax more flattened above, its sutures deeper, and the scale narrower and stouter. It differs from *sayi* also considerably in the coloration of the head, thorax and scale, particularly in the smaller specimens.

Head black; the clypeus, cheeks and space in front of eyes red; the meso- and metanotum above, the upper angle of the metathoracic declivity and the scale black or dark brown. Otherwise as in *Camp. sayi.*

♀. Length, 11 mm.; expanse of wings, 24 mm.

The head is either red, with only the posterior edge of the vertex more or less distinctly dusky, or of the same coloration as in the worker minor. Thorax highly polished, red; posterior edge of pronotum above, a large median spot anteriorly and a subdorsal vitta each side of mesonotum, scutellum, mesosternal plate and abdomen black. Legs and scale red. Posterior margin of abdominal segments yellowish. Wings pale brownish, veins and stigma darker.

♂. Length, 6–7 mm. Entirely black, polished. Posterior margin of abdominal segments, extreme tip and

3. PLAGIOLEPIS LONGIPES (Jerd.) Emery.

Formica longipes Jerdan, Madras Journ. of Litt. & Sc., xvii, 1851, p. 122.

Formica gracilipes Smith, Journ. of Proc. Linn. Soc. Zool., ii, 1857, p. 55.

Formica trifasciata Smith, Catal. Hym. Brit. Mus., vi, 1858, p. 27.

Prenolepis gracilipes Mayr, Verh. zool. bot. Ges. Wien, xii, 1862, p. 698.

Plagiolepis gracilipes Mayr, Tijdschr. v. Entom., x, 1867, p. 73.

Plagiolepis longipes Emery, Ann. Mus. Civ. Genova, xxiv, 1887, p. 247.

Plagiolepis gracilipes Rothney, Trans. Entom. Soc. London, 1889, p. 373.

Numerous ☿ ☿. Todos Santos.

This is the first record of the occurrence of this species in America. As far as observations go, it has heretofore been found only in India, British Burmah, Annam, China, the Sunda Islands, Australia and Samoa.

4. TAPINOMA PRUINOSUM Rog., var. ANALE André.

Tapinoma anale André, Revue d'Ent., vol. xii, 1893, p. 148.

☿. San Julio.

This variety has been also found in various localities in California and at Chihuahua, Mexico.

MYRMICIDÆ.

5. APHÆNOGASTER CARBONARIA n. sp.

☿. Length, 4–5 mm. Head elongate, longer than broad, rounded behind. Face and clypeus densely and finely striated, the striæ coarser and less dense posteriorly, the vertex almost smooth. Frontal area with a median carina. Mandibles longitudinally striated and with a few coarse punctures near the terminal edge. Prothorax with extremely fine striæ at the sides anteriorly. Mesothorax smooth. Metathorax with fine, transverse striæ above, the striæ longitudinal and coarser laterally at posterior half. Metathoracic spines wanting, their position represented by minute, toothlike projections at the termination of the metathoracic ridges. Nodes of petiole erect, the posterior one stoutest. Head, thorax and abdomen furnished with rather sparsely set, fine, erect, yellowish hairs; those of the antennæ and legs shorter and less erect.

Color black, polished. Mandibles, flagellum and tarsi reddish-brown; the flagellum darkest towards base, with the apex of the joints blackish. Scape and legs dark brown.

This species may be easily mistaken for *Aph. Pergandei*, with which it agrees in size and coloration, but may be readily distinguished from it by the striated head and metathorax, the absence of metathoracic spines and the much higher second node of the petiolus.

Described from eight specimens.

Sierra Laguna and El Chinche.

6. APHÆNOGASTER JULIANA n. sp.

Length, 5–7 mm. Head quadrangular, somewhat longer than wide; its sides almost straight, faintly broader behind; posterior angles rounded. Surface polished, with

First node of the petiole large, its sides parallel, stoutest at base, the apex rounded gently curved forward and with two longitudinal impressions. Second node broadly pyriform, stoutest posteriorly, and also with two longitudinal impressions above. Both joints are highly polished and minutely granulated.

Abdomen polished, finely shagreened and sparsely punctured. Hairs yellowish and rather sparse, more dense along posterior margin of abdominal segments; those of the anterior margin of the clypeus are longer and stouter, while those on the under side of the head are very long, slender and curved forward. Hairs of antennæ and legs shortest and semi-erect.

Color dark brown, almost black, the thorax somewhat lighter. Antennæ, mandibles and legs reddish-brown.

This species resembles very much *Aph. Andrei*, which differs from it, however, in the much coarser sculpture of the head and thorax, in the stronger constriction between the meso- and metathorax, the stouter and less strongly curved first node of the petiolus, in the rougher sculpture of both nodes and in the very profuse, bristling, white and glittering hairs, which are most conspicuous on the abdomen and legs.

Described from seven specimens.

San Julio.

7. CREMASTOGASTER BREVISPINOSA Mayr.

Cremastogaster brevispinosa Mayr, Sitzber. Akad. Wiss. Wien, lxi, 1870, p. 403.

Cremastogaster brevispinosa Mayr, Verh. zool. bot. Ges. Wien, xx, 1870, p. 992.

Cremastogaster brevispinosa Mayr, Verh. zool. bot. Ges. Wien, xxxvii, 1887, p. 626.

This species has, so far, been recorded from Costa Rica and the U. S. of Columbia.

Six specimens. Magdalena.

ON SOME PLIOCENE FRESH WATER FOSSILS OF CALIFORNIA.

BY J. G. COOPER.

MARGARITANA SUBANGULATA n. sp. Plate xiv, figs. 1–4.

In form nearly intermediate between *M. margaritifera* Linné and *M. marginata* Say, beaks more prominent and anterior than in the former, less so than in the latter, with twelve or more slight undulations as in *M. undulata* Say. A strong obtuse ridge extends from the beaks to the posterior basal angle as in *Anodonta angulata*, with a gentle curve, and the whole outline is very similar. The hinge, however, is that of a *Margaritana*, as shown in the figure. It is about one-seventh of the length of shell from the anterior end. Surface smooth, except near the beaks, with no irregularities elsewhere. Basal margin varying from slightly convex to slightly arched. Few variations in size or form in the specimens found, five of them nearly perfect. Length, 3.25 inch; height, 1.50; breadth, 0.90. The hinge, still water; the Margaritanas only rivers, though some may wash down into lakes.

Found by Mr. W. L. Watts, in a fresh water deposit on the west border of the Kettleman Plains, a rolling upland full of middle and late tertiary marine fossils. (See his report to the Mining Bureau on oil and gas.)

THE KETTLEMAN LAKE BED.

This fresh water deposit is about ten miles west of Tulare Lake, on the edge of what was probably a pliocene lake, about twenty miles long and five wide, or half as large as Tulare Lake is now, and south of west from it, in the western corner of Tulare County. It is now 400 feet above Tulare Lake, which is itself 200 feet above sea-level. Unless the region has been much uplifted since the former lake existed, the two could not have been connected as one, but some proof of a great uplift is shown in the dip of the fresh water bed, which is 35° to the southwest. A far larger lake than Tulare no doubt existed in the pliocene epoch, if not later, but it could scarcely have been 600 feet deep, even before it broke through the Golden Gate.

The following recent species were found in the same fresh water bed:

1. *Amnicola turbiniformis* Tryon.
2. *Carinifex newberryi* Lea.
3. *Goniobasis occata* Hinds.
4. *Physa costata* Newcomb.
5. *Sphærium dentatum?* Haldeman
6. *Valvata virens* Tryon.

Of these Nos. 2, 4, 5 and 6 still inhabit Clear Lake, Lake County; Nos. 1, 3 and 6 live southward to Alameda County, but none are now known to inhabit any of the lakes or streams farther south.

One other extinct species was also found which I have considered identical with one from Colorado(?), described by Conrad, as follows:

Anodonta decurtata Conrad. Amer. Jour. of Conchology, vol. vi, 1871, p. 200, described and figured from a cast said to be from Colorado. Plate xiv, figs. 5–8.

The six specimens found differ considerably among themselves, partly from compression, partly, it may be, from sexual variation, so I have figured two of the best for comparison, especially as his was only a cast, and these have much of the shell. They show a striking resemblance to Conrad's. No living species seems to be so short, and I would have called it a Unio, if I had not found the hinge well exposed. No Unio is known now to be living near the west coast. The specimens figured are of natural size. With them is one specimen more elongated, and perhaps a form of *A. nuttaliana* Lea, but too imperfect to decide upon. That species is fossil in several other localities of apparently as ancient date. See Pl. xiv, fig. 11.

The Asphalto Lake Bed.

About forty miles southeasterly from the Kettleman bed, in Kern County, is a small fresh water deposit, also found by Mr. Watts, in 1893. This is eighteen miles small form being the only one yet found fossil in any locality. It is even smaller than that found living in Clear Lake, which I have published as var. *minor*. No. 3 a single broken specimen of the *heterostropha* group, very unlike *P. costata*. No. 4 is extremely abundant, often forming masses by itself. It is not now known to inhabit any of the neighboring streams, but is fluviatile in habits, and as most of the mountain streams dry up entirely in some years, it may have been thus exterminated south of Monterey Bay.

The fresh water beds of this valley are still scarcely touched, and probably extend over a very much greater surface. They are not usually well exposed, and difficult to explore. They might be called miocene from their high dip, but this was no doubt from local causes—landslides, etc.

THE CONTRA COSTA LAKE BED.

This lies chiefly on the northeast slope of the hills west of San Pablo Creek, forming the boundary between Contra Costa and Alameda counties in that part of its course, about 4½ miles northeast of the State University. A thin stratum of lignite was found there exposed on the side of a small branch of the main creek along the road going east to Lafayette, and tunnelling into the side of the hill exposed it in places farther north. It has a dip toward the northeast of about 30°, and probably continues eastward under the valley, though not yet seen there, as the value of the lignite would not pay for boring.

In the shaly layers of lignite I found a few fossils, of which figures are here given, and which I call: 1, Anodonta nuttaliana Lea.? var. lignitica J. G. C., plate xiv, fig. 11. 2, Linnæa contracosta J. G. C., plate xiv, fig. 12. 3, Planorbis pabloanus J. G. C., plate xiv, fig. 9, all of natural size.

The shells were crushed flat, but their outlines were so perfect and white in contrast with the black shale, that I had no difficulty in making perfect tracings of them. The engraver for the Mining Bureau took the liberty of trying to restore the surfaces, but it is evident that such crushed shells could not be properly represented as given in that report. Still there was no appearance of any surface characters except lines of growth. The figures are of natural size.

TASSAJARA LAKE? BED.

Along a small branch of Walnut Creek, in Alameda County, north of Livermore, is a deposit which contains chiefly living species, and was formerly called quaternary, but one extinct species has been described from there, and its high elevation, nearly corresponding with the bed last described, makes it probable that it may better be called pliocene. The species were mostly given in the Catalogue of California Fossils, compiled by me for the State Mining Bureau's report of 1888.

1. *Bythinella binneyi* Tryon.
2. *Carinifex newberryi* Lea.

6. *Limnophysa humilis* Say.
7. *Limnophysa palustris* Linné.

THE SANTA CLARA LAKE BEDS.

Fossil fresh water shells have been found at several points on both sides of this valley, and at different heights above it, but sufficient specimens have not yet been collected to determine the ages, elevations, disturbances, etc., of the various beds. The oldest known is that at San José Mission, where a ridge apparently of pliocene date remains as a remnant of a thick bed of gravel and alluvium once filling the greater part of the valley to a depth of probably 300 feet above tides. The same deposit is seen at intervals from East Oakland along the foothills southward on the east side of the valley, and less abundantly on the west side to near Redwood City, but does not everywhere contain fossils. It is considerably disturbed in some places, usually by elevation of the mountains since its deposit. A dry gravel bed in the west end of Livermore valley may be of the same age, and bones of land animals are found in many places, some of them probably contemporaneous, some later.

Dr. L. G. Yates first found the beds at San José Mission, and I have visited them. The species obtained are the following:

1. *Amnicola yatesiana* J. G. Cooper. Plate xiv, fig. 10 (×5).
2. *Cochliopa rowellii?* Tryon=*Pompholopsis?*
3. *Pomatiopsis intermedia* Tryon.
4. *Helix californiensis* Lea, var. *ramentosa* Gould.

As no extinct species except *Amnicola yatesiana* have been found in the other deposits in Santa Clara County, I will merely add a list of the species obtained from them, and await further collections and surveys. This species has also been found in a well bored in Tulare County at 1,058 feet depth, and once probably existed as abundantly west of the Sierra Nevada as *A. longinqua* did east of them, but is now extinct, as the latter is, except in Utah. The above list is continued as follows:

5. *Anodonta nuttaliana* Lea.
6. *Carinifex newberryi* Lea, var. *minor.*
7. *Gyraulus vermicularis* Gould.
8. *Valvata virens* Tryon.

All but No. 5 are found at "Gelcich's Coal Mine," in Santa Cruz Mountains, and in other deposits.

Besides the fresh water shells mentioned above, there are nearly twenty species given in the Catalogue of California Fossils, published in the Report of the State Mineralogist for 1888, with the localities where they were found.

STUDIES IN CEANOTHUS.

BY KATHARINE BRANDEGEE.

The genus Ceanothus, as at present received, is entirely North American, and largely Californian; decreasing rapidly north, south and east both in the number of forms and of individuals and in size. It forms a considerable portion of the "Chapparal" of California, equaling or exceeding the "Manzanitas" in quantity and outnumbered only by the "Chamis." The beauty and fragrance of a blossoming hillside of Ceanothus make a strong impression upon all who behold it for the first time, and in consequence some of the species have long been cultivated in European gardens.

Torrey & Gray in the Flora of North America recognized twenty-three species north of Mexico; eleven of them being there first characterized. Watson in Proc. Am. Acad. x, 169–175, admitted twenty-eight; reducing four of the previous list and describing one new species. Trelease in Proc. Cal. Acad. i, 106–118 (1888) raised the number to thirty-two, reducing one of the previous list, describing three new species and raising two varieties to specific rank. Dr. C. C. Parry in two papers * increased the number to thirty-three, reducing five of the last list and describing seven as new (one of which he reduced in his second paper). Since that time seven species have been described—all in § Cerastes.

Of these revisions the last is the most important, being largely based on field studies, which in this genus are peculiarly desirable. Dr. Parry was the first to make known the prevalence of natural hybrids, the ease with which they are recognized in the field, and the corresponding difficulty of their determination in herbarium

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* Proc. Daveup. Acad. v, 162–174 & 185–194.

specimens. On the other hand he neglected opportunities which would have added immeasurably to the value of his labors; thus he described *C. intricatus*, from the summit of Mount Tamalpais, which he never ascended, though living for months at the time in its immediate vicinity; *C. foliosus* and *C. divergens* from the flanks of Mt. St. Helena in perfect ignorance of the forms prevailing in the easily accessible upper portion, and he spent a considerable time in the Ojai Valley near Santa Barbara, without attempting to collect in their original locality the five species described from the latter place by Nuttall.

One of the earliest undertakings of this study of Ceanothus was the verification of these species from the "bushy hills of St. Barbara." In this investigation the conclusion was soon reached that *C. divaricatus* was invalid. It is either a form of *C. hirsutus* or one of the abounding hybrids of that plant with *C. spinosus*. *C. divaricatus* has always been a source of confusion in Californian botany. It is represented in most herbaria by specimens of *C. hirsutus (C. sorediatus)*, *C. cordulatus* or *C. Palmeri*. *C. oliganthus* in typical forms is readily recognized, but grades into *C. hirsutus*. Undue perfectly known, and it will be many years before the species are even approximately settled. The set of about a hundred forms studied in the field by the writer and distributed to the principal herbaria of the United States is apparently the first attempt to bring these variations, with the necessary notes, to the attention of botanists. It has been too much the rule with collectors to neglect these connecting forms and gather only the typical or the extremes. Imperfect as this set is it must convince every unprejudiced student of the genus that there are already far too many accepted. All the new species recently proposed are intermediates between species themselves doubtfully separated by slight and inconstant characters.

The species of Ceanothus are distinguished almost entirely by leaf forms. There is no constant character of fruit or flower by which any one of the species can be separated from others of the same section. The habit is so readily modified by environment as to be of small value. The character of penninervate or trinervate leaves which has been used to divide the Euceanothi fails completely. The presence or absence of marginal glands is not to be trusted, and the pubescence is admitted to be variable; many of the species, as *C. velutinus*, *C. cordulatus*, *C. arboreus*, *C. thyrsiflorus*, *C. Fendleri*, etc., having as now known glabrous as well as pubescent forms.

All the species north of Mexico bloom in the spring—in the latitude of Central California, at moderate elevations, from March till May. At elevations of 5,000–8,000 feet, from June to August. Along the Coast they often begin to blossom sparingly in January. All the western species bloom from the old wood, but often continue blooming on the new shoots. The inflorescence is axillary, the leafy peduncular shoot which in some species is much elongated, dying after the fruit has ripened. The period of bloom is about six weeks, but many of the species bear flowers at other times.

The hybrids of Ceanothus are found wherever two species of the same section grow together. As a rule, to which there are, however, many exceptions, no two species of the same section (only two sections are here recognized) occupy the same area. Either one grows at a higher elevation or at a different exposure, and the hybrids occur along the lines of junction. They seem usually to be fertile, and show every gradation from one to the other parent. The only infertile hybrid, within its section, known to me is No. 69, *C. incanus* × *papillosus*. In this the ovaries are more or less abortive and no fruit was formed. Of the hybrids between members of the different sections only two are known, *C. Veitchianus*, which appears to be *C. thyrsiflorus* × *C. rigidus* and *C. rugosus*, which is *C. velutinus* × *C. prostratus*. Nearly if not quite all the species described from European gardens are hybrids of *C. Americanus* and *C. azureus*—most of them artificial.

Ceanothus is very readily and completely killed by the ing form in a given district. Where the seedlings survive in great numbers, cross-fertilization being made certain by the swarms of insects attracted to their fragrant flowers, a continual crossing takes place, not only between the original forms, but between the hybrids and their parents on either side.

Many of the species accepted in this paper are likely to prove too closely related as their forms become better known. No one, so far as I am aware, has yet made any systematic attempt to collect over the whole area the forms of even the nearly allied Eastern species. The probable hybrid origin of several of the species raises a question of some importance, which may perhaps be easiest answered, as in the case of the willows, by propagating the distinct forms and hybridizing them artificially.

In the pages following the original descriptions of nearly all the species, with the exception of *C. Americanus* and its well-settled synonyms, are republished *verbatim*, in the hope that future students of the group may find them as great a convenience as they would have been to the writer. The modification which descriptions undergo by increasing knowledge of their variations is often very great, and it seems to me the duty of monographers to give the original diagnoses in addition to their own, so that their readers may be in possession of the data necessary to form some sort of independent opinion, without the necessity of acquiring a considerable library.

For kind assistance and favors, I have to thank the curators of the herbaria of Harvard, Kew, Columbia College, Philadelphia Academy of Sciences, U. S. Agricultural Department, Missouri Botanic Garden and the Boston Horticultural Society. For specimens and notes of distribution, etc., I am indebted to C. G. Pringle, Edward Palmer, J. G. Lemmon, S. B. Parish, J. W.

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CEANOTHUS.

"CEANOTHUS, *Linn. Gen. n.* 267.—Flores hermaphroditi. Calyx 5-fidus, tubo turbinato v. hemisphærico, lobis 3-angulari-ovatis acutis membranaceis conniventibus. Petala 5, sub disco inserta, longe unguiculata, inter lobos calycis porrecta, limbo cucullato. Stamina 5, petalis longiora, filamentis filiformibus. Discus crassus, tubum calycis implens. Ovarium disco immersum, cum eo semiadnatum v. liberum, 3-lobum, angulis sæpe glandulosis; stylus brevis, 3-fidus, stigmatibus decurrentibus v. terminalibus. Drupa supera, subgloboso-3-loba, basi tubo calycis cincta, 3-cocca, epicarpio tenui, coccis crustaceis

§ *Euceanothus.*

Leaves alternate, normally 3-nerved, nearly always more or less glandular on the margins. Stipules slender, caducous. Peduncles elongated, usually compound, often more or less leafy. Fruit more or less resinous, smooth, warty or crested. Fruiting pedicels slender. Calyx usually rather small.

A. *Leaves caducous. Flowers ordinarily white.*

1. CEANOTHUS AMERICANUS L. *C. trinervus* Moench, Meth. 651 (1794); *C. herbaceus* Raf. Med. Repos. v. 360 (1808); *C. tardiflorus* Hornem. Hort. Hafn. i, 230(1813); *C. intermedius* & *perennis* Pursh, Flor.-Am. Sept. i, 167 (1814); *C. macrophyllus* Desf. Tabl. ed. ii, 232 (1815); *C. ovalifolius* Wender in Schr. Naturf. Ges. Marb. ii, 247 (1830) [?]; *C. officinalis* Raf. Med. Fl. ii, 205 (1830); *C. glomeratus, latifolius, ellipticus* & *virgatus* Rafn. New Flora, part iii, pp. 54–57 (1836); *C. Pitcheri* Pickering Mss. ex. T. & G. Fl. i, 264 (1838); *C. decumbens, macrocarpus* & *reclinatus* Hort. ex. Steud. Nom. ed. 2, i, 313 (1840); *C. procumbens hybridus* & *Dillenianus* Hort. ex. C. Koch, Dendrol. i, 619–20 (1869).

CEANOTHUS AMERICANUS, L. sp. 195. "Foliis ovatis acuminatis serratis trinerviis subtus pubescentibus, thyrsis elongatis, rachi pubescente. ♄. in America bor. Mill. ic. t. 57. Sims. bot. mag. t. 1479. Flores ut in sequentibus albi. Fructus obtuse trigonus."—DC. Prod. ii, 31.

2. CEANOTHUS OVATUS Desf. *C. ovalis* Bigel. Fl. Bost. ed. ii, 92 (1824); *C. glandulosus* "my Forrestia thyrsoides of 1809" Raf. New Flora, iii, 57 (1836); *C. mollissimus* Torr. Fremont's First Rep., 88 (1843), name only.

CEANOTHUS OVATUS Desf. "3. Céanothus à feuilles ovales. *Ceanothus ovatus.* C. foliis ovatis, dentato-crenatis, glabris; fructu hexagono. Amer. sept. D." Desfontaines, Histoire des Arbres et Arbrisseaux, vol. ii. p. 381. (1809.)

3. CEANOTHUS SANGUINEUS Pursh. *C. Oreganus.*[*]

CEANOTHUS *sanguineus*, foliis obovatis, serratis subtus pubescentibus, paniculis axillaribus thyrsoideis brevissime pedunculatis, pedicellis aggregatis.—Near the Rocky Mountains, on the banks of the Missouri. *Lewis.* ♄. May, June, *v. s. in Herb. Lewis.* Branches blood-red or purple; panicles not longer than the leaves.—Pursh. Fl. Am. Sept. i, 167, (1814).

4. CEANOTHUS MICROPHYLLUS Michx. *C. serpyllifolius.*[†]

Ceanothus microphyllus; subdecumbens, glabriusculus, foliis perpusillis, passim fasciculatis, obovalibus oblongisve, integriusculis: corymbulis ramulorum terminalibus. OBS. Radix, uti præcedentis, crassius tuberosa, rubra. HAB. in herbosis sabulosis sylvarum Georgiæ et Floridæ.—Michaux, Fl. Bor-Am., i, 154 (1803).

C. ovatus and *C. sanguineus* appear to me to be only forms of *C. Americanus*, which, even including them, would have a much smaller range of variation than *C. thyrsiflorus*, which as compared with *C. Americanus*, has a quite restricted distribution. *C. serpyllifolius* differs little from *C. microphyllus*, certainly not enough to merit even a varietal name. Certain forms of *C. ovatus*, as Parry's No. 167 of Mex. Bound. Surv. Coll., make a distinct approach to *serpyllifolius*.

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[*] *C. Oreganus* (Nutt.! mss.): "leaves broadly ovate, subcordate, mostly obtuse, serrate, membranaceous, somewhat pubescent beneath [3-ribbed from the base]; thyrsoid corymbs in lateral panicles; fruit small, globose, obtusely 3-lobed, without pulp. C. sanguineus, *Hook.! Fl. Bor.-Am. i. p.* 125, not of *Pursh.*" Woods of the Oregon from the Blue Mountains to the

5. CEANOTHUS INTEGERRIMUS H. &. A. *C. Californicus*,* *C. Nevadensis*,† *C. thyrsiflorus* var. *macrothyrsus*‡ and *C. Andersoni*.§

Ceanothus integerrimus; glaber, ramis subangulatis parce resinoso-viscosis, foliis 3-costatis submembranaceis oblongo-ellipticis obtusis integerrimis subtus pallidioribus, paniculis elongatis multifloris, floribus glomeratis albis.—A very distinct species, with quite entire leaves, and very long narrow panicles of white flowers. Except on the very youngest leaves or branches, there is no appearance of pubescence on the plant. Ovary without projecting lobes.—H. & A. in Bot. Beech., 329 (1840).

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* *Ceanothus Californicus*, Kellogg. This species is nearest allied to *C. Oreganus*, hence to contradistinguish it we give the above provisional name.—Branches robust, bright green, glabrous, swelled at the axils, those of the present season's growth thick, tender and succulent; leaves in the young state lanceolate, acute and long acuminate, becoming broadly ovate, cordate at base, acute or sub-acuminate, three-nerved, veins very prominent, lamina thin, entire, glabrous above, glaucous beneath, sparsely pubescent, with appressed hairs along the veins.—Stipules conspicuous, texture leafy lanceolate-acuminate, numerous short shoots of tender axillary branchlets. Flowers white on long stout lateral branch-like compound paniculate peduncles, six inches in length, one or more leaves at the base. Appears to be a deciduous species. [Placerville, E. W. Garvitt.] —Proc. Cal, Acad., i, 55 (1855), ed. 2, p. 54.

† *Ceanothus nevadensis*, (Kellogg.) Fig. 45. Stem bright green, similar to the leaves, nearly glabrous, warted, scarcely angled.—Leaves ovate, subacute, mucronate by a conic gland, entire, lamina thin, sub-coriaceous, dull lustrous pitted above (not varnished nor resinous); glaucous, reticulate, and very short appressed pubescent below, three moderately prominent ribs from the base; the smaller leaves often ovate-oblong, sub-acute or somewhat obtuse. Petioles very slender, appressed pubescent, half an inch or more in length, a few dark purple conic glands above scattered along the upper third, stipules subulate, acuminate, ciliate. Panicles elongated, terminal, five or six inches in length, leafy at the base, secondary subdivisions very short, filiform, pedicles glabrous like the calyx. Flowers white, small, calyx segments incurved.—REMARKS.—This species appears to be closely allied to *C. velutinus*. But the leaves are not rounded, cordate, nor serrate, neither is the slender elongated racemoid-panicle "thrice compound," nor in the general appearance is it so large and robust. Could the shaded damp and lofty habitat of this plant cause so great difference as we have observed? The leaves, we observed, are not at

In this distribution *C. integerrimus* is represented by No. 24 from Calaveras Big Trees, No. 25 from Sisson, and No. 26 from Alta. No. 21 is one of the intermediates approaching *Parryi*. No. 22 from the Geysers, Sonoma County, and No. 27 from Cahto, Mendocino County, are intermediates between *C. integerrimus* and *C. parvifolius*. Nos. 28 and 29, from the type locality are *C. Andersoni*.

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all varnished, shining, nor resinous, nor exhaling the strong odor of *C. velutinus*.—Torrey says *C. velutinus* has "axillary panicles." This is probably a mistake, if we recollect rightly. These certainly are not axillary. [Yo-Semite Valley, Madam Wertherman].—Proc. Cal. Acad., ii, 152 (1862).

‡ *C. thyrsiflorus* var.? MACROTHYRSUS: foliis ovatis acutis integerrimus supra glabriusculis subtus canescenti-tomentosis; paniculis interruptis subfoliaceis. HAB. Banks of the Umpqua, Oregon.—A shrub 6-8 feet high; the branches terete, often dotted with minute brown resinous papillæ. Leaves 1 to 2½ inches long, moderately acute, grayish-tomentose underneath, the veins prominent and somewhat silky-villous; petioles 3-5 lines long. Flowers beautiful blue, in compound umbellate fascicles, which are aggregated in a paniculate manner at the extremity of the branches, the

Var. PARVIFOLIUS Wats. Bot. Cal. i, 102 (by misprint parviflorus in the original). *C. parvifolius.*[*] No. 23 from Calaveras Big Tree Grove.

[*C. integerrimus*] var.? *parviflorus.* Of very slender habit, wholly glabrous; leaves much smaller, about half an inch long, short-petioled; flowers light blue in rather short simple racemes. In the Sierra Nevada from the Yosemite Valley northward. Possibly distinct but intermediate forms occcur. It is 51 Bridges, 1628 Brewer, 3880 and 4870 Bolander, 68 and 68*a* Torrey, and was also collected by Bigelow and by Dr. Gray.—Watson in Proc. Am. Acad. x, 334 (1875).

Var. PARRYI (Trel.) No. 20 from Toll House, Mt. St. Helena.

C. PARRYI, n. sp. Branches glabrate or sparingly villous, strongly sulcate, more or less papillate: leaves narrowly elliptical-oblong, obtuse, 15×30 mm. or less, glandular serrulate, glabrous above, the lower surface rusty-tomentose, at least along the veins: inflorescence oblong, interrupted, terminating recurved-ascending slender, few leaved branches: flowers blue. [Leaves narrow, 3-nerved, the nerves often concealed by the revolute margins; fruit about 3 mm. in diameter.]—Known to me only from specimens found in cultivation at Calistoga, Cal. (*Parry*, 1881, No. 33).—Trelease in Proc. Cal. Acad. ser. 2, i, 109 (1888).

Ceanothus integerrimus with the varieties enumerated above is the only species properly belonging[†] to the Californian flora which shows entirely naked winter branches. The dead peduncular branchlets of the preceding year are often conspicuous below the fresh flowering, and, though not peculiar to the species, are to a certain extent distinctive. The range of variation is very great, as may be seen in No. 26, all the branches included under that having been collected within a few rods, and as no other species of the section was found in the vicinity, there could be no suspicion of hybridity. The leaf margin in the typical form is ordinarily entire and glandless, with the exception of the single one terminating the midrib, but in var. *Parryi* and forms approaching it the margin is often dentate-glandular. Some examples otherwise nearly typical are tridentate at the apex, each tooth terminated by a gland. The pubescence is commonly of straight hairs and most abundant beneath, but in a specimen from Forest Ranch, Butte County, otherwise typical, the hairs are crisped as is usual in var. *Parryi*. The lateral nerves of the leaves are often wanting in the narrower forms, but not constantly so in any; the texture is sometimes nearly as coriaceous as in *C. spinosus*, which some of the forms approach rather closely in the nearly smooth profusely resinous fruit as well as in the shape of the leaves and the absence of glands. The flowers are either blue or white in all the forms excepting var. *Parryi*, which, so far as known, has only deep blue flowers. The range of the species is from Washington to southern Arizona. Var. *parvifolius* in its extreme form has been collected only in the Sierra Nevada, but variations connecting it with typical *integerrimus* abound in the Coast Range. All the forms are conspicuously absent from Southern

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[*] CEANOTHUS PARVIFOLIUS. *C. integerrimus*, var.? *parvifolius* Watson *l. c.* [Proc. Am. Acad. x] 334.—California to Oregon.—Trelease in Proc. Cal. Acad. ser. 2, i, 110 (1888).

[†] *C. sanguineus* occurs in California only in the Siskiyou mountains along the northern boundary.

B. *Leaves persistent.*

a. SPINOSI. *Branches mostly divaricate often spinose, leaves 1- or 3-nerved coriaceous, usually entire and sparingly glandular. Flowers commonly white or pale.*

6. CEANOTHUS SPINOSUS Nutt.

C. spinosus (Nutt.! mss.): "glabrous; branches thorny; leaves cuneate-oblong, or oblong, obtuse or emarginate, lucid, entire or obscurely glandularly serrulate towards the apex (1-ribbed, pinnately veined]; flowering branchlets divaricate, leafy; thyrsus oblong; ovary subglobose without protuberances. Mountains of St. Barbara.—A straggling shrub. Leaves somewhat coriaceous, obsurely veined, pubescent beneath in the young state, 8–10 lines long." Flowers white or blue; pedicels 2–3 lines long. *Nuttall.*—Nearly allied to the preceding species. There is a pair of obscure nerves from the base of the leaf; but they are scarcely as large as the veins which proceed from each side of the mid-rib.—Torr. & Gray, Fl. N. Am. i, 267 (1838).

Var. PALMERI (Trel.) *C. divaricatus* var. *grosseserratus,*[*] *C. divaricatus* var. *eglandulosus,*[†] *C. eglandulosus.*[‡]

C. PALMERI, n. sp. Glabrous throughout, or a very few hairs on the leaves and petioles: branches greenish, becoming brown: leaves mostly on short spurs, slender-petioled, about 40 mm. long, elliptical or ovate-oblong, rounded at both ends, mucronate or emarginate, entire, thinner, than in the last (*C. spinosus*) [not at all 3-nerved: fruit 5 to 6 mm. in diameter]: flowering branches ascending, naked or few-leaved: inflorescence oblong, nearly simple: exocarp of fruit rather fleshy.—Mountains of

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[*] *Ceanothus divaricatus*, var.? GROSSE-SERRATUS: foliis majoribus, grosse-serratus, acutiusculis. Station not recorded. Branches thorny at the extremities; serratures of the leaves acute; flowers blue —Torr. in Pac. R. Rep. iv, 75.

[†] *Ceanothus divaricatus* var. EGLANDULOSUS foliis integerrimis (margine nec denticulatis glanduliferis) obtusissimis. On mountains near San Gabriel; March 22. Also with vestiges of last year's fruit. Cohon Pass, March 16. (Collected by Dr. Parry on the mountains east of San Diego; in fruit and in flower by Mr. Wallace at Boca de Teyunga, April.) This has the flowers, the divaricate spinescent branches with whitish bark, and also the foliage of C. divaricatus, except that none of the specimens show a trace of the glandular denticulations so manifest in the specimens of

Southern California (*Palmer*, 1875, No. 42). Intermediate between *C. spinosus* and *C. integerrimus*.—Trelease in Proc. Cal. Acad. ser. 2, i, 109 (1888).

Typical *C. spinosus*, as far as our present knowledge goes, is confined to the vicinity of Santa Barbara. It not unfrequently assumes a tree form which in size of trunk is second only to *C. thyrsiflorus*. The lateral nerves of the leaves are often developed, and the leaves of young bushes are strongly serrate toothed. The flowers are usually pale blue—sometimes white. No. 13.

The variety is common on the lower slopes of the mountains bordering the San Joaquin Valley and of the southern part of the State, extending southward as far as Mount San Pedro Martir, in Baja California. It ordinarily has usually 3-nerved leaves, and like all the species of this section, as well as *C. integerrimus*, is either green or glaucous. The flowers are commonly blue but occasionally white, and in the form found on San Pedro Martir, which answers best to *C. divaricatus* var. *grosseserratus*, deep purplish blue. No. 10, Nuevo, San Diego County; No. 11, Pasadena, Los Angeles County; No. 12, Tehachapi, Kern County; No. 108, San Pedro Martir, in Baja earliest, *grossecserratus*, perhaps named a hybrid; at any rate, specimens from near Nuevo, which agree with the description, are without doubt hybrids with *C. tomentosus*. *Eglandulosus* is conspicuously misleading as a varietal name of a species in which the presence of glands is ground for suspicion of hybridity.

7. CEANOTHUS INCANUS T. & G.

C. incanus: branches short and very thick, minutely canescent; leaves broadly ovate, obtuse, mostly subcordate, coriaceous, crenate-serrulate, minutely velvety above, whitish and canescent beneath [3-ribbed from the base]; clusters subsessile, axillary and terminal. California *Douglas!*—Branches numerous, whitish with an exceedingly minute hoariness. Leaves an inch or more in length, rather crowded. Flowers white, in dense subglobose clusters, from very short and thick spurs or axillary branches.—Torr. & Gray, Fl. N. Am., i, 266 (1838).

This is one of the best marked species, though approaching quite closely the preceding, from which in our present knowledge it is separated chiefly by its warty fruit. From the next it is distinguished by the same character and by its much greater size and different distribution. It is found in scattered groups in both the outer and inner Coast Range, from Santa Cruz to Mendocino. The leaves are sometimes entirely glabrous. The large, thickly warty fruit is often 4-coccous. No. 4, Bradford, Lake County; No. 5, Felton, & No. 6, Ben Lomond, Santa Cruz County; No. 60, hybrid with *C. papillosus*; No. 66, hybrid with *C. thyrsiflorus*.

8. CEANOTHUS CORDULATUS Kell.

Ceanothus cordulatus (Kellogg).—Fig. 39—A shrub four or five feet in height, branches erect, flexuose; branchlets numerous, very short, divaricate, leafy at the base, terminating in a stout thorn; whitish glaucous; stems strictly terete.—Leaves small (i. e., one-quarter to one-half an inch long, rarely three-eighths broad) three-ribeed (with two other outer obscure nerves) ovate-cordate, entire, often emarginate, reticulate, with translucent veins, short hirsute above and below, especially conspicuous along the nerves beneath; petioles short, hirsute, in the mature state stout, seldom one-sixteenth of an inch long, in the young state two or three times that length and very slender, minutely pubescent; lamina becoming thickened and coriaceous, persistent.—Stipules cubulate, hirsute. Leaves alternate in fasiculate clusters, somewhat conescent beneath.—Flowers in thyrsoid panicles one to two inches in length, springing from the summit or approximate lateral branchlets; peduncle and pedicels sub-glabrous.—Calyx petals and pedicels white at the time of blossoming, but bright pea-green before expansion; panicles sometimes leafy at the base.—The form of flowers as usual in this genus; calyx divisions inflexed turbinate; petals saccate or hooded; unguiculate pistil three-parted about one-third its length. Fruit unknown.—This species appears to be near *C. hirsutus* (Nutt.); but the leaves are not "nearly sessile," nor "glandularly serrulate," nor "panicles terminal." Nor does it answer to *C. divaricatus* (Nutt.), as the leaves are not "grandularly serrulate," and seldom half the size; nor are the flowers "blue." [Washoe, J. A. Veatch].—Proc. Cal. Acad., ii, 124 (1861).

From Oregon to San Pedro Martir in Baja California and eastward in the mountains of Nevada, at elevations of 4000–10,000 feet, principally in the Sierra Nevada, but occurring on Snow Mountain in Lake County. It is known as "snowbush" or "bluebrush," and forms entangled thickets 2–6 feet in height, the green and glaucous forms often intermingled. Throughout California, as far as known, the flowers are white, but on San Pedro Martir they are of all shades, from white to purplish blue. The fruit is resinous, rarely warty, and with moder-

9. CEANOTHUS BUXIFOLIUS HB.

Ceanothus buxifolia Humb. et *Bondpl.;* spinosus, foliis ellipticis utrinque glabris trinerviis serratis, floribus paniculatis. *Reliqu. Willd. MS.—In America merid.* ad Rio del Monte. ♄. *Humb.* et *Bonpl.*—Roemer & Schultes, Syst., v. 300 (1819).*

This species is still very insufficiently known. Some forms recently collected connect rather closely with *C. Fendleri.*

10. CEANOTHUS FENDLERI Gray.

CEANOTHUS FENDLERI(sp. nov.): intricato-ramosissimus; ramis ramulisque teretibus gracilibus sæpe spinescentibus cinereo-puberulis demum glabratis lævibus; foliis parvulis (⅓–½ unc. longis) ovalibus seu ellipticis obtusis integerrimis eglandulosis trinerviis subtus sericeo-canescentibus supra glabriusculis viridibus; glomerulis densis sessilibus; floribus glabris albis.—Mountains east of Santa Fé in sunny places; June (in flower), and July, in fruit. Shrub about a foot and a half high and two feet in diameter.—Allied to C. depressus Benth Pl. Hartw., no. 29; but much more slender, the Thyme-shaped leaves smaller and not glandular, &c. Fruit about as large as in C. Americanus.—Gray in Plantæ Fendlerianæ Novi-Mexicanæ, i, 29, (1848).

Colorado, Wyoming, Utah, New Mexico and Arizona.

b. ANGULATI. *Branches erect, more or less angular. Leaves glandular on the margin, usually velvety or tomentose beneath. Flowers, except in the first species, nearly always deep blue. Fruit commonly rather large.*

11. CEANOTHUS VELUTINUS Dougl. *C. lævigatus*† Dougl.

Ceanothus velutinus; ramis subpendulis, foliis rotundato-ellipticis coriaceis argute glanduloso-dentatis triplinerviis supra nitidis quasi vernicosis glaberrimis subtus incano-velutinis, racemis terminalibus, ramis thyr-

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* The reference of this species and *C. bicolor* HB. is incorrect, both in DC. Prod. and in the Kew Index.

† *Ceanothus lævigatus;* foliis rotundato-ellipticis coriaceis argute glanduloso-dentatis triplinerviis omnino glaberrimis supraque nitidis et quasi vernicosis, paniculis in ramos breves terminalibus, floribus coarctatis.—C. grandis. *Douglas, MSS.*—HAB. Nootka. Mr. Menzies. Mountains near

soideis, inferioribus foliosis. (Tab XLV.)—*Douglas* MSS in *Herb. Hort. Soc.*—*Frutex* 3–8-pedalis, ramis teretibus glabris, ramulis junioribus solummodo appresso-pubescentibus. *Folia*, in hoc genere, ampla, petiolata, 3-4 uncias longa, 2½ ad 3 uncias lata, alterna, coriacea, lato-rotundato-elliptica, basi obtusa, raro subcordata, apice obtusa, margine pulcherrime et argute glanduloso-denticulata, triplinervia, supra glaberrima, nitida, quasi vernice obducta, subtus mollissima, incana, tactu præcipue velutina, nervis prominentibus. *Petiolus* fere unciam longus, tenui-pubescens. *Paniculæ* terminales elongatæ, ramis glabriusculis, thyrsiformibus, inferioribus, ad basin, folium gerentibus. *Pedicelli* graciles, fasciculati. *Flores* albi, glaberrimi. *Calyx* profunde 5-fidus; *tubo* perbrevi, *disco* margine incrassato repleto, medio pistillifero; *limbi segmentis* erecto-incurvis, ovatis, subacuminatis. *Petala* patentia, obovata fere cucullata, longe unguiculata. *Stamina* ante petala. *Filamenta* petalorum longitudine. *Antheræ* subglobosæ. *Germen* subrotundum. *Stylus* elongatus, staminibus brevior. *Stigma* bi-trifida, segmentis subrecurvis. *Bacca* sicca, 2-3-locularis, 2-3-sperma. *Cocculi* chartacei. *Semina* obovata, nitidissima, atro-fusca.—Hab. Subalpine hills near the sources of the Columbia and at the "Kettle Falls." *Douglas*. Tab. XLV, Fig. 1, Flower; fig. 2, Vertical section of do.; fig. 3, Berry; fig. 4, Seed:—*magnified*.—Hook. Flor. Bor.-Am. 1, 125 (1830).

This species, very well marked by the resinous upper surface of the leaves, is of rather northern distribution. In California it hardly reaches below the middle of the State, unless it may be on the high mountains. Along the Coast it appears not to reach the southern border of Mendocino County. In the inner Coast Range it is not

snows of winter. The glabrous form is not deserving of varietal rank, and so far as they have come under my notice the specimens distributed under the varietal name do not agree with description; the only truly glabrous form I have seen grows in Napa County. No. 1, Donner, Placer County; No. 2, Mt. Shasta; No. 3 (glabrous form), Mt. St. Helena, Napa County. The common hybrid, and the only one known to me in which this species is concerned is No. 9 from Donner, Placer County, mentioned on a preceding page under *C. cordulatus*.

12. CEANOTHUS THYRSIFLORUS Esch. *C. elegans*,* Lem. Ill. Hort. vii (1860) t. 268. *C. bicolor* Raf. New Flora, part iii, 57 (1856)†.

CEANOTHUS THYRSIFLORA. C. foliis ovalibus trinervibus serrulatis glabris, caule multangulari, paniculis thyrsoideis in ramis axillaribus. In novæ Californiæ fruticetis. Frutex biorgyalis. Caulis strictus multangularis glaber, in angulis granulatus, fuscus. Folia sparsa conferta, breviter petiolata, pollicaria ovalia, plerumque obtusa, raro acuta, submucronato serrulata, trinervia glabra, in nervis et venis panim pilosa. Stipulæ triangulares acuminatæ deciduæ. Inflorescentia panicula thyrsoidea in ramis axillaribus, paniculæ quatuor aut quinque cunctæ cymau in caulis apice formant. Flores ante anthesin bracteis ovatis acutis cinereo tomentosis caducis tecti. Calix urceolaris cœruleus. Petala ovata alba.—Eschsch. in Mém. Acad. Petersb., ser. vi, x, 285 (1826).

The range of this species is quite restricted. It is confined to a narrow strip along the coast from the northern border of California to the Santa Lucia Mountains in Monterey County and never occurs more than a few miles from the coast. In fact it is strictly confined to the redwood belt. Of all the species it has the greatest range of unquestioned variation, both in size and in the form and texture of the leaves. It is commonly a rather tall shrub branching near the base, but at Noyo, Mendocino County, it becomes a tree with clean trunk, 10–12 inches in diameter, unbranched for 4–6 feet and 25–30 feet in height with an equal spread of branches; while on the bleak and wind swept hills overlooking Point Lobos Signal Station at San Francisco it forms perfectly flat mats carpeting the ground for many feet in extent. Its variations in form, size and pubescence of the leaves and in the form and size of the thyrse are sufficiently shown in the specimens. No. 15, Monterey, a broad-leaved form with flowers and fruit in almost globular heads; No. 16, Santa Cruz Mountains; No. 17, Mt. Tamalpais, near San Francisco; No. 18, Bolinas Ridge, Marin County; No. 19, San Gregorio, San Mateo County (white-flowered). The hybrids represented in this collection are No. 52 *(C. Lobbianus)* with *C. dentatus;* No. 57 with *C. papillosus;* Nos. 64 and 65 with *C. sorediatus;* No. 63 with *C. foliosus*, and No. 107 *(C. Veitchianus)* with *C. rigidus. C. floribundus* a second hybrid with *C. dentatus* is not exactly represented by any of the forms distributed.

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*I have not seen the description.

† Applied by Rafinesque to *C. thyrsiflorus* "since all the sp. are thyrsiflore."

13. CEANOTHUS ARBOREUS Greene.

some forms of *C. azureus* of which it has nearly the fruit. It is so far as known confined to the islands off the coast of California and is yet insufficiently known. It is common on Santa Catalina Island, where, as Prof. Trelease notes, it was collected by Nuttall, and it is there very rarely arborescent. Mr. Brandegee collected on Santa Rosa Island a perfectly glabrous form of strikingly different appearance and with much smaller fruit. It was perhaps this form which led Prof. Sargent to refer the plant to *C. velutinus*. While it is too near other species to hold specific rank, it seems best to retain it until further field studies are made, especially of the forms found on Santa Rosa Island.

14. CEANOTHUS AZUREUS Desf. *C. cæruleus*,† *C. bicolor* HB.,‡ *C. glandulosus*,§ *C. azureus* var.? *parvifolius*.‖

Ceanothus azureus, pubescens; foliis ovato-oblongis acuminatis, scabro-serratis, subtùs ramisque tomentosis, paniculis thyrsoideis: partialibus et simplicibus brevibus ex fasciculis plurifloris in pedunculo crasso tomentoso à basi ad apicem dispositis.—Ceanothus azureus. *Deſfont. tabl. 232; (ed. 1816).*—Ceanothus cæruleus. *Loddiges botan. Cabinet.* 110.—*Frutex*

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† *Ceanothus cæruleus:* foliis oblongis subcordatis serratis, subtus tomentosis: racemis compositis pedunculatis.—Habitat in Nova Hispania. ♄.—Semina missit *D. Sesse.*—Lagasca. Gen.ª et Spec. 11 (1816).

‡ *Ceanothus bicolor Humb.* et *Bonpl.;* foliis ovali-lanceolatis serratis trinerviis subtus canescenti-tomentosis, paniculis terminalibus. *Reliqu. Willd. MS.*—Roem. & Schultes Syst. v, 300 (1819).

§ *Ceanothus glandulosus* n. sp., ramis glandulosis, foliis oblongis, basi obtusiusculis, apice acutis, margine subulato-serrulatis, subtus tomentosis, supra glabris vix lineatis subtriplinerviis, racemis compositis paniculas terminales constituentibus, primum bracteatis; bracteis ovatis fere subulato-acuminatis apice patulis; pedunculis rhachibusque tomentosis. Frutex altus, floribus cœruleis, pr. las Trojes Octobri flor. Schiede leg.—Sine omni dubio a praecedente [*C. azureus*] distinguendus. Si apices ramulorum lateralium florigerorum pyramidis modo in ramis dispositorum intueris nondum florentes, Salviam potius aliamve Labiatam videre cre-

erectus, ramis teretibus tomentosis, tandèm subferrugineis. Fol. *subtriuncialia latitudine sesquiuncialia v. circitèr, molliuscula, suprà nudiùs pubescentia virentia immersè nervosa et subrugoso-venosa nervis 3 principibus longitudinalibus ascendentèr ramosis subtùs varicosis, serraturæ marginalis dentibus mucrone vel spinulà cartilagineà præfixis tomento paginæ pronæ tandem subferrugineo:* petiolus *pluriès brevior lamina pubescens:* stipulæ *aridæ, caducæ, acuminatæ.* Paniculæ *in ramulis oppositis axillaribus provenientes, bracteatæ, axillares, simplices semunciam vix excedentes, terminales compositæ partialibus alternis* bracteis *furfuraceis caducis loco foliorum interstinctis:* pedicelli *1-flori filiformes æquales pilosi albidi erecti per phalanges plurifloros bracteatos aggregati.* Flores *azurei, inexpansi magnitudine granum seminis Coriandri subæquantes.* Cal. *petalorum concolor et opaciùs, oblato-campanulatus, subpentagonus, ultra medium 5-fidus segmentis conniventibus ovato-angulatis membranaceis.* Cor. *erecto-radiata;* pet. *5, fornicato- vel galeato-spathulata, divisuris calycis insita hisque ⅓ circà longiora, æqualia;* unguis *lineari angustus, convoluto-canaliculatus, deorsùm attenuatus;* lamina *introrsum galeato-fornicata, lateribus productioribus, antheram usque ad anthesin fovens.* Stam. *æqualia petalis:* fil. *fundo calycis inserta erecta:* anth. *luteæ, erectæ, subrotundo-ovatæ, quadrilobo-biloculares, loculis compressis.* Germ. *viridissimum, oblatum, glabrum, 3-angulare, cinctum annulo glanduloso disci calycini:* stylus *tripartitus, cærulescens, divisiones filiformes fasciculatæ apicæ replicatæ æquales calyci, puncto stigmatoso simplici.*—Mr. Brown, while visiting the garden of La Malmaison near Paris the year before last, saw this rare, and then unrecorded, shrub, in one of the garden-frames of that

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des ob bracteas dense congestas, subtomentosas, coloratas?, apice patulas, omnium ramulorum lateralium inferne denudatorum et fastigii apices oc-

establishment, and was much struck by its beauty, the plant being at that time loaded with clusters of fragrant azure blossom. It has been since imported into this country from Mr. Parmentier's collection at Enghien, by Messrs. Loddiges; and our drawing was made from a sample which flowered in their nursery at Hackney in April last. It is said to be very difficult to propagate, consequently likely to continue rare. Probably native of Mexico, certainly of America, but not of New Holland, as has been stated elsewhere.—Bot. Reg., iv, 291, pl. 291 (1818).

The accepted name of this species is a nomen nudum. It is in the place cited [*] simply mentioned as "Ceanothus azureus azuré. ♄." The diagnosis was not published until 1818. Therefore as *C. cæruleus* was published with a brief diagnosis in 1816 it should have been taken as the proper name, but as *C. azureus* has been in common use for nearly eighty years, it seems to me no good purpose can be served by changing it.

The narrow-leaved form described by Dr. Watson is undoubtedly connected in complete series with the type, as is the case with similar forms of *C. thyrsiflorus*.

15. CEANOTHUS DEPRESSUS Benth.

CEANOTHUS *depressus*, sp. n., ramis teretibus crassis rigidis divaricatis, ramulis brevibus sæpe spinescentibus, foliis elliptico-ovatis obtusis trinervibus supra puberulis demum glabratis, subtus albo-tomentosis, margine integerrimis glandulosis, glomerulis multifloris densis sessilibus folia subæquantibus, floribus glabris.—C. incano, Torr. et Gr. affinis, sed distinctus. Folia pleraque semipollicaria.—Benth. in Plantæ Hartwegianæ 8, (1839). No locality is mentioned, but Hemsley in Biologia Cent.-Am. i, 199, gives Hartweg's station as Zacatecas, North Mexico.

This species is still so little known that its affinities can only be conjectured. It may not belong to this group. The solitary leaf that I have seen reminded somewhat of a common Ceanothus of San Diego County, which in this paper is included in the following species.

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[*] Desf. Tabl. ed. ii, 232, 1815.

c. GLANDULOSI. *Branches terete, slender, more or less resinous-warty. Leaves 1- or 3-nerved of rather thin texture, conspicuously glandular. Fruit small, moderately crested. Flowers mostly deep blue (usually pale in C. hirsutus) but occasionally white in all of them.*

16. CEANOTHUS OLIGANTHUS Nutt. *C. Orcuttii.**

Ceanothus oliganthus (Nutt. mss.): "Stem and branches villous; leaves elliptical-ovate, nearly glabrous above, villous beneath, glandularly serrulate, rather obtuse [3-ribbed from the base]; panicles lateral and terminal, very short, few-flowered, naked or leafy towards the base, persistent; disk pentangular; ovary with 3 protuberances at the angles nearly as large as itself. Bushy woods on the hills of St. Barbara, California.—A shrub. Leaves on moderately long petioles. Clusters of flowers scarcely longer than the leaves. Flowers white, rather large." *Nuttall.*—Torr. & Gray, Fl. N. Am., i, 266 (1838).

This species has long been included in *C. hirsutus*, although in the localities where they grow together they are easily distinguishable. They are however connected by such a series of intermediates that it seems best to consider *C. hirsutus* merely a variety. The name *oliganthus* has precedence. No. 30, Santa Barbara; No. 31, Pasadena; No. 32 (*C. Orcuttii*), mountains back of

The forms of this species have been more troublesome to botanists than even those of *C. spinosus* or *C. integerrimus.* *C. divaricatus* answering to Nuttall's description and fragmentary specimens, is not recognizable as a valid species at the type locality. It is there represented by many slightly differing forms, either variations of *C. hirsutus* or hybrids of that species and *C. spinosus.* Under the name of *C. divaricatus* in most herbaria there are usually to be found *C. spinosus* var. *Palmeri; C. cordulatus*, or the more rigid forms of *C. sorediatus*.

C. sorediatus is merely the northward extension of *C. hirsutus*, and *C. intricatus* is as its author came to know only *C. sorediatus* in its smaller and more rigid growth.

Var. HIRSUTUS (Nutt.) *C. divaricatus*,* *C. sorediatus*,† *C. intricatus*.‡

Ceanothus hirsutus (Nutt. mss.): "Somewhat spiny and almost hirsute, particularly the young branches; leaves cordate-ovate, glandularly ser-

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**Ceanothus divaricatus*(Nutt.! mss.): "Somewhat thorny, nearly glabrous; leaves elliptical-oblong or oblong-ovate. lucid, somewhat obtuse, minutely and glandularly serrulate, pubescent (particularly on the nerves) beneath; flowering branches divaricate; leafy thyrsus interrupted; rather loose; ovary sub-globose, without protuberances. Mountains of St. Barbara and also near the town. April.—A straggling shrub. The abortive branchlets at length become spinose. Leaves 8–12 lines long, somewhat coriaceous, 3-nerved from the base, the lateral nerves obscure: petioles about 2 lines long. Thyrsus oblong, with several remote fascicles in the axils of the leaves. Flowers blue. Fruit about the size of a peper-corn. *Nuttall.*—Torr. & Gray, Fl. N. Am., i, 266 (1838).

†*Ceanothus sorediatus;* ramis teretibus resinoso-verrucosis, ramulis patentibus subsericeis, foliis elliptico-ovatis obtusis subcoriaceis minute glanduloso-dentatis 3-costatis supra glabris subtus incano-pubescentibus ad nervos sericeis, glomerulis multifloris densis folio parum longioribus (floribus cæruleis).—The short dense glomerules of flowers resemble those of the first species [*C. spinosus*]; but these flowers are blue. The germen too is without lobes. The branches are copiously studded with resinous warts, in the more exposed parts of the stem, frequently forming large patches."—H. & A. in Bot. Beech., 328 (1840).

‡*C. intricatus*, n. sp. Densely branched, younger shoots hirsutely

rulate, nearly sessile, rather obtuse [3-ribbed from the base]; panicle terminal, elongated, leafy; disk obscurely pentangular; protuberances of the ovary small. In thickets with the preceding, to which it is closely allied.—A straggling shrub. Young branches, leaf-buds and bracts very hairy; the upper surface of the leaves also almost villous. Fruit rather small." *Nuttall.*—Torr. & Gray, Fl. N. Am., i, 266 (1838).

The examples of *C. hirsutus* in this collection are: No. 37, Santa Barbara; Nos. 38, 39, 40 *(C. sorediatus)*, mountains between San Francisco and Santa Cruz; No. 41, Tamalpais and No. 42, Bolinas Heights *(C. sorediatus)*; No. 43 *(C. intricatus)*, summit of Tamalpais. The hybrids are: No. 58, with *C. papillosus;* Nos. 61 and 62, with *C. foliosus;* Nos. 64 and 65, with *C. thyrsiflorus;* and No. 68, with *C. spinosus.*

Var. TOMENTOSUS (Parry). *C. azareus,** *C. nitidus.*†

CEANOTHUS TOMENTOSUS, n. sp. *C. sorediatus* Parry, not Hook. & Arn. Character transferred and enlarged. Four to eight feet in height with slender branches light gray or reddish, younger shoots densely rusty-

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pubescent; leaves somewhat rigid, crowded on short stems, short petiolate, narrowly ovate (15 x 6 mm.), dull green above, hoary pubescent beneath, triple-nerved from the base, with inconspicuous mid-veins, more or less strongly revolute, margins entire, but glandularly ciliate; inflorescence tomentose, deciduous on the older branches; leaves short petiolate, sparsely scattered on the branches, with short fasciculate branches in the axils, oval to sub-cordate, 10-25 mm. in length, dull green, smooth above, tomentose beneath, strongly triple-nerved from the base, irregularly and coarsely glandular serrate, occasionally sub-lobed; inflorescence compact or oval, on short or more or less prolonged peduncles, flowers intense azure; fruit 3 mm. broad, with inconspicuous crests at maturity.—*Habitat:*—known to the writer only from the brown saustone ledges of Ione, Amador County, associated with *Arctostaphylos myrtifolia*, Parry, flowering in March, fruit in May.—~~Trelease~~ in Proc. Davenp. Acad. v, 190 (1889).

In the Botany of California this plant which is found at elevations of 1,000–2,000 feet in the central Sierra Nevada, was included under *C. sorediatus*. It bears a considerable resemblance to forms of *C. azureus*, but differs in leaf outline and tomentum. *C. azareus* Kell. is the older name but was palpably a misprint. Possibly Dr. Kellogg discovered after its publication that there was an earlier *C. azureus*, for he did not correct the spelling when the first volume of the Proceedings of the California Academy of Sciences was reprinted. *C. nitidus* referred in Bot. Cal., Watson's Index and the Kew Index, to Pac. R. Rep. iv, 75, is not to be found at the place cited or elsewhere in the Survey volumes. No. 35, Ione, Amador County, type locality.

In this variety is included a plant from Southern California, which is about equally related to *C. tomentosus* and *C. hirsutus*. It is represented in this distribution by No. 33 from San Diego; No. 34 from Encinitas and No. 36 from Nuevo, San Diego County; and by No. 110 from

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fascicles of flowers covered by a single ovate, acute, pubescent bract, at length descending.—The fruit we have not seen. The largest leaves are scarcely one inch in length, five-eighths broad, on short petioles from one-eighth to one-quarter of an inch in length; the smaller and more numerous fascicles of axillary leaves about one-quarter to one-half these dimensions [Placerville, E. W. Garvitt].—Proc. Cal. Acad. i, 55 (1855); 2d ed., p. 54.

† "*C. nitidus* Torr." Bot. Cal. i, 103 (1880), name only.

San Pedro Martir. Nos. 2023 and 2028, Parish, from San Bernardino County, is either a broader-leaved form or a hybrid.

17. CEANOTHUS DIVERSIFOLIUS Kell. *C. decumbens.**

Ceanothus diversifolius—Kellogg. Branches both old and young, peduncles, petioles and leaves, densely villous; lateral branches divaricate, slightly nodding. Leaves oblong-ovate or elliptical-ovate, obtuse, or subacute, 3-nerved, in most of the young leaves the lateral nerves are obscure; lamina thin membranous, densely villous, bluish green and slightly glabrous beneath, shorter villous pubescent above, not shining, retuse-mucronate-dentate; teeth somewhat cuspidate, glandular, petioles about ¼ the length of the leaf. Flowers in long axillary, simple racemes, somewhat pendant, flowers mostly crowded into a corymbose cluster at the extremity on pedicels of ¼ to ⅜ of an inch long, colored racemes 2 to 3 inches long; scarcely leafy at the base, although a few scales are observed, and occasionally a very minute leaf; flower buds covered with small pubescent bracts, at length deciduous,—calyx more infolded, and less cowled than usual in this genus, giving the flower an angular or ribbed appearance, style exserted, united to the top, stigma barely divided, branches green, colored on the sunny side, and studded with small flat glandular warts [Dr. K. exhibited specimens and a drawing of a species of Ceanothus from Placerville, E. W. Garvett].—Proc. Cal. Acad. i, 58 (1855); Ed. 2, p. 57.

Dr. Kellogg's name is much the older, but his description giving no indication of its decumbent character, caused the Sierra Nevada, to which the typical form seems to be confined.

Var. FOLIOSUS (Parry). *C. foliosus*, *C. Lemmoni.**

C. *foliosus*, n. sp. Branches slender, divergent, pubescent when young; leaves somewhat coriaceous, crowded, fasciculate, small—5 to 8 mm. long—ovate, obtuse, narrowed at base to a short petiole, irregularly crenate, with frequent resinous glands, obscurely triple-nerved near the base, not revolute at the margin but inclined to fold back on the midrib; inflorescence terminal and axillary, loosely globose, or slightly elongated; flowers few, on short pedicels, light blue; fruit triangular, 3-4 mm. broad, sharply crested at the summit. *Habitat:*—A densely branched shrub, 3-5 feet high with light green leaves, more or less resinous glandular; has been referred to C. *dentatus*—included above as a variety of C. *papillosus*—from which it differs in every essential character. In its general features it comes nearest to the South Atlantic coast species, forming with them a well-marked group, approximating the section [CERASTES] following. The specimens seen were collected in the upper Napa Valley, where it is abundant, being associated with C. *Parryi* and C. *divergens*.—Parry in Proc. Davenp. Acad., v. 172 (1889).

Typical *C. foliosus* or the still more pronounced form found on Tamalpais seems to be far enough removed from either *C. decumbens* or *C. Lemmoni*, but they are all closely connected by forms common in Lake and Mendocino counties. *C. foliosus* has been usually considered a form of *C. dentatus*, to which it is indeed rather nearly related. No. 46, Cahto, Mendocino County; No. 47, Mt. Hanna, Lake County; No. 48, Mt. St. Helena, Napa County (type locality); No. 49, Tamalpais; No. 50, Bolinas Heights; No. 111 (*C. Lemmoni*), Bartlett Mountain, Lake County. The range of the variety is quite extended. It has been collected on the Cuyamaca Mountains, San Diego County.

**Ceanothus Lemmoni*, n. sp.: Two feet high or less, spreading with rigid branches, bark lightish gray, more or less hairy pubescent on the younger stems; leaves narrowly elliptic to oval, 10 to 25 mm. in length, smooth above, ciliate pubescent on the veins beneath, glandular-serrate, the serrations most distinct on young, vigorous shoots, stipules somewhat rigid; inflorescence short on prolonged leafy peduncles, flowers of a light or faded blue color; fruit 4 mm. broad, conspicuously crested. *Habitat:*—Johnson's Ranch, near Quincy, Plumas County, Lemmon, 1874,—May 30, 1889. Rocky slopes of the upper Sacramento Valley, 1888-9, C. C. Parry.—Parry in Proc. Davenp. Acad., v. 192 (1889).

18. CEANOTHUS DENTATUS T. & G. *C. impressus.*[*]

Ceanothus dentatus: branches (and veins of the leaves beneath) tomentose with rusty hairs, leaves much crowded and fascicled, coriaceous, oblong-cuneiform, retuse, toothed, with revolute margins, more or less hairy on both sides [1-ribbed, pinnately veined]; peduncles elongated, nearly terminal; thyrsus oblong, of numerous umbel-like fascicles; ovary with three protuberances at the summit. California, *Douglas!*—Leaves scarcely half an inch long, strongly and remotely feather-veined, pitted beneath, irregularly and obtusely toothed. Peduncles an inch or more in length. Flowers crowded, white.—Torr. & Gray, Fl. N. Am. i, 268 (1838).

This species in its typical form appears to be confined to the vicinity of Monterey. It is quite possible that a better knowledge of its extension and variations will show that it should include *C. decumbens* and its forms. The general habit and texture is the same, which counts for a great deal where the differences between species are so very slight. No. 51, Monterey (flowers white in some of the specimens). *C. impressus* appears to be nothing but

Var. PAPILLOSUS (Torr. & Gray).

Ceanothus papillosus: branches tomentose; leaves narrowly oblong, much crowded, fascicled in the axils, densely and softly tomentose beneath, glandularly denticulate on the margin [1-ribbed, pinnately veined]; peduncles aggregated, clusters somewhat capitate; ovary triangular, the angles projecting at the summit. California, *Douglas!*—Branches terete. Leaves 1-1½ inch long (those fascicled in the axils smaller), fringed on the margin with numerous capitate glandular teeth; the upper surface conspicuously papillose and somewhat hairy. Peduncles numerous at the summit of the branches; the flower-buds at first invested with ovate woolly bracts: pedicels 2-3 lines long. Flowers blue.—Torr. & Gray, Fl. N. Am. i, 268 (1838).

In Dr. Parry's revision of Ceanothus *C. dentatus* was reduced to *C. papillosus*. He had not then seen *C. dentatus* growing, and after so seeing it, altered his opinion. He was, however, without knowledge of the forms since collected, and contrasted the typical forms of each. The epidermis of *C. papillosus* is occasionally white and deciduous as is shown in No. 56, and even in some specimens of Parry's distribution, a character which strengthens its relationship to *C. Lemmoni*. Miss Eastwood has collected specimens in the Santa Lucia Mountains with lilac flowers, and extremely narrow leaves, which are closely revolute. The range of the variety is shown by the localities given for the specimens. On the bare grassy mesas sloping upward from the sea at San Simeon, it grows prostrate on the ground, often entirely hidden by the grass and stunted weeds. This form, No. 53, is frequently quite destitute of papillæ. No. 53, San Simeon; No. 54, Ben Lomond, Santa Cruz Mountains; No. 55, Big Tree Grove, near Santa Cruz; No. 56, Forest Grove, near Wright's, on the eastern slope of the Santa Cruz Mountains. The known hybrids (Nos. 57, 58, 59, 60) have been already noticed under *C. integerrimus*, *C. incanus*, *C. thyrsiflorus* and *C. hirsutus*.

§ *Cerastes.*

Leaves usually opposite, pinnately-veined, coriaceous, persistent, never glandular; subulate stipules deciduous from the persistent corky base. Fruit never resinous, hardly sulcate between the cocci, usually with conspicuous hornlike protuberances above the middle. Species all very closely related, perhaps best treated as varieties of a single species.

19. CEANOTHUS CUNEATUS (Hook). *C. cuneatus* var. *ramulosus.**

Rhamnus? cuneatus; ramis subferrugineo-pubescentibus, foliis oppositis in axillis fasciculatis coriaceis brevissime petiolatis cuneatis obtusis, retusisve supra glabris subtus pubescentibus albidis reticulatis.—"Rhamnus." *Douglas MSS.*—HAB. North-West America. Abundant near the sources of the Multnomak River, in sandy soils, growing under the shade of *Pinus Lambertiana*. *Douglas.*—I have retained this in the genus *Rhamnus*, it being so named by Mr. Douglas in the Herbarium of the Horticultural Society: but when its flowers and fruit shall be known, it will probably prove to be something very different, even from the Order *Rhamneæ*. It constitutes a harsh *shrub*, from four to twelve feet high, with numerous, stout, rigid, terete, opposite, subpatent, and subspiniform *branches*, very leafy, and clothed with a rusty-coloured down. *Leaves* the largest of them scarcely an inch long, and those oblong, cuneate at the base, while those on the younger parts of the branches are more decidedly cuneate, and nearly flat. From the axils of some of the leaves, and from a terminal pair in others, arises a *peduncle?* clothed with rusty-brown hairs, and bearing a globose bud, or cluster of buds (apparently of very young flowers), surrounded by small, rusty, closely-pressed *bracteæ?* But of the nature of these flowers I can make nothing. The whole plant yields, even when not rubbed or bruised, a balsamic odour like that of some *Balsam-Poplars*, mixed with a powerful astringency resembling the smell of young *Birch twigs*.—It is to be hoped that during his present arduous journey through North-West America, Mr. Douglas will obtain flowering and fruit-bearing specimens of this singular plant.—Hook, Fl. Bor-Am., i, 124 (1830).

Through the northern part of its range *C. cuneatus* is moderately well defined. In the region of the central Sierra Nevada it barely reaches the altitude of 4000 feet, and at this elevation is only 2–3 feet in height with drooping branches. In the foothills of the great valley of California it is a rather rigidly upright bush, with white flowers, and often covering a large extent of country; it is above bushes called "chapparal." In Lake County the prevailing form has very small leaves. In the Coast Range it reaches its largest size, and the flowers run through all the shades from white through lilac to deep purple-blue. No. 95, San Marcos Pass, near Santa Barbara; No. 96, Tamalpais; No. 97, Mt. Hamilton; No. 98, Boulder Creek, Santa Cruz Mountains; No. 99, Tehachapi; No. 100, Lake County; No. 101, Leesville, Colusa County; No. 102, Mt. St. Helena; No. 103, Blue Cañon, Placer County; No. 104, Cobb Mountain, Lake County; No. 105, Sheep Ranch, Calaveras County. The hybrids are all with *C. prostratus* and its forms. No. 76, Blue Cañon; No. 77 (hybrid with var. *divergens)*, Cobb Mountain; No. 78 *(C. connivens)*, Sheep Ranch; No. 81 (hybrid with var. *pinetorum)*, Bradford, Lake County.

Var. MACROCARPUS (Nutt.). *C. megacarpus.**

15. *Ceanothus macrocarpus* (Nutt.! mss.): "Branchlets canescent with a

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* Nuttall, Sylva, ii, 46. Changed because of the earlier *C. macrocarpus* DC. which is now referred to Colubrina.

rusty-colored pubescence; leaves alternate, rather crowded, sometimes a little fascicled in the axils, thick and coriaceous, obovate-cuneate, entire, often emarginate, glabrous above, whitish and minutely tomentose-canescent beneath, [1-ribbed, pinnately veined]; flowers in lateral pedunculate nearly simple umbels; fruit very large, with three projecting horn-like appendages at the summit." Mountains of St. Barbara, California, *Nuttall!*—A shrub 3–6 feet high. Fruit twice or thrice as large as in the preceding.—Torrey & Gray, Fl. N. Am., i, 267 (1838).

With this I would include the "*C. crassifolius*" of the lists from Santa Catalina and Santa Cruz islands, which is indifferently either alternate- or opposite-leaved. *C. macrocarpus* is said in Flora Franciscana to belong to the "Summits of Santa Ynez Mountains." I found it to be most common at low elevations. The fruit, as will be seen, is very variable in size. The shrub at Santa Barbara appears to be constantly alternate-leaved, but just beyond the summit of the pass occurs *C. cuneatus* (No. 95) with opposite leaves and scarcely otherwise to be distinguished. The character is evidently of no specific value in view of the behavior of the island form. Alternate leaves are occasionally found in other localities, on vigorous shoots of otherwise normal plants. No. 89, Santa Barbara; No. 88, Santa Catalina Island.

From Encinitas, San Diego County, to Guadalupe Creek, Baja California, always near the coast. No. 90, San Diego; No. 91, Encinitas; No. 113, Guadalupe Creek.

Var. RIGIDUS (Nutt.).

17. *C. rigidus* (Nutt.! mss.): "Young branches pubescent; leaves opposite and crowded, cuneate-obovate, mostly retuse, thick and coriaceous, mucronately crenate-toothed, glabrous above, somewhat canescent beneath, [1-ribbed, pinnately veined]; umbels axillary and terminal, few-flowered, sessile; pedicels at length elongated; ovary with 3 protuberances. Bushy woods near Monterey, California. March.—A shrub about 6 feet high, rigid, intricately branched, almost spinose. Leaves about half an inch long, sometimes nearly obcordate; teeth conspicuous; the veins, etc., as in the preceding. Clusters of flowers composed of several small crowded umbels; the pedicels gradually elongating to the length of 3-4 lines. Calyx and corolla bright blue." *Nuttall.*—Resembles the last two species in many respects.—Torr. & Gray, Fl. N. Am., i, 268 (1838).

Under this variety it seems best to include nearly all the forms of the Cerastes section which have opposite more or less dentate leaves and conspicuous warty stipules as in typical *C. verrucosus.* Some of the forms make a close approach to *C. cuneatus*, while others connect very closely with *C. prostratus.* No. 92, San Simeon; No. 93, Monterey (type locality); No. 94, Tamalpais; No. 106, Bolinas Heights; No. 112, San Pedro Martir; No. 114, San Felipe Creek, Colorado Desert, California. No. 107 *(C. Veitchianus)*, hybrid with *C. thyrsiflorus.*

Var. GRANDIFOLIUS Torr.

CEANOTHUS RIGIDUS var. GRANDIFOLIUS. Punta de los Reyes; April 18. The leaves are three times larger than in the ordinary form of this species, and strongly spinose-toothed on the sides, as well as at the extremity. This variety seems to show almost a transition to C. prostratus through the broad-leaved form of that plant noticed below; but we are not willing to unite the two species, without seeing a more extensive suite of specimens for comparison.—Torr in P. R. R., iv, 75 (1857).

In Watson's Index this variety is placed under *C. crass-*

ifolius. No. 82, near Cahto, Mendocino County. What appears to be this variety was collected on Guadalupe Island by Dr. Palmer and by Dr. Franceschi.

Var. GREGGII (Gray).

> CEANOTHUS GREGGII (sp. nov.): divaricato-ramosissimus; ramulis tomentenso-puberulis; foliis confertis ellipticis oblongisve integerrimis coriaceis crassis uninerviis glabellis subtus leviter penninerviis primum tomentulosis (3–5 lin. longis); pedicellis pubescentibus (demum glabratis) flore albo paullo longioribus.—(Battlefield of Buena Vista, *Gregg;* in flower.) Side of mountains near Frontera, New Mexico, July; in fruit.—Shrub 2–5 feet high, with very rigid branches. Pedicels shorter than the leaves. Flowers small. Fruit about 2 lines in diameter.—I have only poor specimens of this species. It bears a considerable resemblance to small-leaved forms of C. cuneatus, *Nutt.*; but the leaves are not narrowed towards the base, and the pinnate veins underneath are obscure.—Gray in Plantæ Wrightianæ, ii, 28 (1853).

C. Greggii, of which I have not seen the type, is almost equally connected with *C. rigidus* and *C. cuneatus*. To it is perhaps best referred *C. vestitus** (part of No. 99, from Tehachapi), though it is apparently quite as near some of the forms referred to the next variety. Specimens of *C. rigidus* collected at San Simeon (No. 92) are intermediate between *C. Greggii* and *C. rigidus*, and connect closely with the next variety.

(floribus albis). Hills and sandy plains, Cajon Pass, March 16; Teyung, California, *Mr. Wallace* 1854. Dr. Parry discovered this well-marked species in the mountains south of Los Angeles, while acting as botanist, under Major Emory, in the Mexican boundary survey.—Pac. R. Rep. iv, 75 (1857). Mex. Bound. Survey, ii, 46, pl. 11 (1859).

While typical *C. crassifolius*, such as Nos. 84 and 85, appears quite distinct from any form of *C. rigidus*, the forms found growing together at South Side bring them very near together. No. 83, South Side (Soledad Cañon), Los Angeles County; No. 84, Foster's, San Diego County; No. 85, Newhall, Los Angeles County; No. 87, Summit of Santa Ynez Mountains, Santa Barbara.

21. CEANOTHUS PROSTRATUS Benth.

CEANOTHUS *prostratus* sp. n.: fruticosus, prostratus, glaber, resinosus, foliis oppositis cuneatis apice spinuloso-tridentatis coriaceis obscure penninervibus, thyrsis brevibus sub-umbelliformibus.—Fruciculus ramosissimus, rigidus, in terram prostratus. Rami et folia omnia opposita. Ramuli juniores subangulati, demum teretes. Stipulæ auguste, lanceolatæ acutæ, fuscæ, linea breviores. Folia 6-9 lin. longa, basi in petiolum brevem augustata, versus apicem divisa in dentes seu lobos 3 spinescentitriangulares quorum intermedius vulgo latior, cæterum integerrima, crasso-coriacea. Venæ laterales in folio juniore iis C. cuneati similes sed in adultiore vix conspicuæ sunt, et pagina inferior etsi pallida vix canescit. Ramuli floriferi 1—1½ pollicares, basi raro instructi foliorum pari ramealibus conformium, sepius aphylli, folia nempe floralia cum stipulis concreta, et mutata in bracteas orbiculatas concavas membranaceas deciduas 1½-2 lin. longas. Nodi floriferi dilatati, in quoque ramulo 1-2 quorum ultimos pedicellos emittit circa 6 graciles, 4-6 lin. longos, et inferior pedicellos similes 2 v 3. Rarius pars florifera ramuli elongatur et nodos præbet floriferos plurimos approximatos pruciflоros. Flores cærulei magnitudine C. cuneati. Ovarium glandulis 3 elevatis coronatum.—In montibus Sacramento.—Benth. in Plantæ Hartwegianæ, 302, (1848).

This does not well describe the species as it occurs in the higher elevations from Washington to Central California but applies much better to some of its hybrids with *C. cuneatus*, such for instance as the one described as *C. connivens* Greene. The leaves in the forms from northern and elevated regions, which must be taken as representing the species, are 5–9-toothed. The fruit in all the forms here included differs from that of all other species in being more fleshy and often bright red, and the protuberances from the upper part of the fruit are ribbed and unusually prominent. Through the forms of its variety *pinetorum* it approaches closely both the northern and southern forms of *C. rigidus*, but if not held apart from that species the whole Cerastes section would have logically to go as varieties under *C. cuneatus*. No. 70, Donner, Placer County; No. 71, Mt. Shasta; No. 72, Blue Cañon, Placer County; No. 75, Calaveras Big Tree Grove. The hybrids in this collection have been mentioned under *C. velutinus*, and under *C. cuneatus*, with which it mixes freely in all degrees. In all the observed hybrids the fruit resembles *C. cuneatus*, except in one instance, a specimen collected at Susanville, Lassen County, not in sufficient quantity for distribution.

Var. DIVERGENS (Parry).

C. divergens, n. sp. Branches rigid, divergent, hoary pubescent when young; leaves 10-20 mm. long, 5-10 mm. broad, very rigid coriaceous, cuneate at base to a very short petiole, broadly truncate at summit, with prominent midrib, the principal pinnate veins terminating in sharply mucronate broad serratures, dull green above, with distinct rows per, Dr. Parry, probably from age and feebleness, did not ascend the mountains on the slopes of which he described species of Ceanothus, and was therefore often misled as to their range of variation. *C. divergens* was described from low elevations but higher up and on the northward slopes of the same and the adjacent Cobb Mountain it grows in just as flat squaw-mats as are found in the Sierra Nevada, though the fruit is much smaller and the leaves more spinose. No. 73; Cobb Mountain, Lake County; No. 74, Mt. St. Helena, Napa County. No. 77 is a hybrid with *C. cuneatus.*

Var. PINETORUM (Coville).

CEANOTHUS PINETORUM sp. nov. PLATE VI. Plant of the sub-genus *Cerastes*, 0.6 to 1 meter high, densely branched; branches divaricate, dark brownish red when young; leaves opposite; stipules at maturity nearly as thick as broad, ovate in outline, acute, divaricate, reflexed, from 2 or 3 to 5 mm. long, light brown, glabrous, spongy, and when old powdery within; petiole 1 to 2 mm. long; blade broadly oblong, rounded at base and apex, 0.5 mm. thick, commonly 12 to 16 mm. long, glabrous or with traces of early pubescence, spinulose-dentate, with 4 to 6 teeth on each side, the under surface venose-reticulate, with minute white areolæ; flowers not collected; fruiting peduncle 0.5 to 1.5 cm. long, about 2 mm. thick; fruiting pedicel of about the same length, somewhat slenderer; fruit 7 to 9 mm. long in addition to the crests, these about 3 mm. long; seed oblong, about 4 mm. in length, black and shining at maturity.—Type specimen in the United States National Herbarium, No. 1738, Death Valley Expedition; collected August 30, 1891, near Lyon Meadow, Sierra Nevada, Tulare County, California, by Frederick V. Coville.—The species was seen only in the forests of *Pinus jeffreyi*, on the head waters of Kern River, in the valley that lies between the two main crests of the Sierra Nevada. The very large fruit, the form of the leaves, and the erect habit of the plant distinguish it from all the species of the sub-genus. In our specimens the conspicuous enlargement of the stipules is remarkable.—F. V. Coville in Contr. U. S. Nat. Herb., vol. iv, 80 (1893).

With this is included *C. Jepsonii,** which differs in its more undulate leaves and less corky stipules. Besides the type locality *Ceanothus pinetorum* was collected on a sand bar of the Kern River, near Kernville, in 1891, in flower. Its flowers were blue. The form described as *C. Jepsonii* is common at middle elevations in Lake County, where it is a very rigid bush 4–7 feet high, with rather large white flowers. This form is farther removed than any of the others from typical *C. prostratus*, but it is brought nearer by the coast forms. Thus at Liberty's, Marin County, and similar elevations of a few hundred feet in that neighborhood, it is still a rigid upright bush, but with blue or purple flowers; while on the neighboring flanks of Tamalpais at elevations of 2000 feet or more its branches droop often to the ground, much in the manner of the variety *divergens*. No. 79 *(C. Jepsonii)*, Bradford, Lake County; No. 80, Tamalpais; No. 81, hybrid of *C. cuneatus* and *C. Jepsonii*.

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* CEANOTHUS JEPSONII. Low bush *rigidly erect* and intricately branching, 2-4 ft. high, the branches and branchlets short and very stout, divaricate, puberulent when young: leaves ¾ in. long, hard-coriaceous, *oblong*,

NAMED HYBRIDS.

I. *Hybrids of Euceanothus.*

It was formerly the custom, now happily somewhat fallen into neglect, to describe species from plants prop-

Ceanothus Baumannianus Spach. Feuilles lancéolées ou lancéolées-oblongues, pointues, légèremente dentelées, pubérules en dessous aux nervures. Panicules subthyrsiformes, raccourcies, denses, pubescentes ainsi que les ramules.—Tiges suffrutescentes, très-rameuses, hautes de 1 à 2 pieds, pubescentes vers, leur sommet. Feuilles longues de 12 à 18 lignes, larges de 3 à 5 lignes. Fleurs très-petites, d'un bleu de ciel assez vif.—Cette espèce très élégante a été envoyée au Jardin du Roi par MM. Baumann, qui la cultivent à Bollwiller, sous le nom de *Ceanothus microphyllus;* mais l'espèce à laquelle Michaux a appliqué ce nom est fort différente.—Spach, Hist. Nat. des Veg. ii, 460 (1834).

Ceanothus Delilianus Spach. — *Ceanothus pulchellus* Delile, in Hort. Monspel.—Ce Céanot, dont on ignore l'origine, est peut-être une hybride du *Céanot azuré*, dont il ne diffère que par ses feuilles plus larges, légèrement pubescentes (non cotonneuses-ferrugineuses) en dessous, et par ses fleurs d'un bleu plus pâle. Quoi qu'il en soit, c'est une plante à signaler à l'attention des horticulteurs, parce qu'elle supporte en plein air le climat du nord de la France. On la cultive depuis plusieurs années au Jardin du Roi.—Spach. Histoire Nat. des Vegetaux ii, 459 (1834).

Ceanothus glaber Spach. Feuilles ovales ou ovales-oblongues, arrondies au sommet ou rétrécies en pointe mousse, glabres aux deux faces, dentelées. Panicules simples ou plus ou moins rameuses, très-denses, sub-thyrsiformes, raccourcies, glabres.—Sous-arbrisseau haut de 2 à 3 pieds. Tiges simples ou rameuses, très-glabres, rougeâtres. Feuilles fermes, d'un vert gai, longues de 2 à 3 pouces, sur 10 à 20 lignes de large. Fleurs blanches. Fruit d'un brun noirâtre, de la grosseur d'un grain de Poivre: coques presque non carénées au dos.—Cette espèce qu'on confond avec la précédente [*C. Americanus*] n'est pas rare dans les jardins.—Spach. Hist. Nat. des Veg,, ii, 459 (1834).

Ceanothus Fontanesianus.—*C. ovatus* Desf. *β. Roseus*; *γ. Cyaneus.* Feuilles oblongues, ou ovales-oblongues, ou ovales-lancéolées, ou oblongues-lan-

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lected from a bed of seedlings which had been raised from *C. Americanus*, fertilized by *C. azureus*. The plant is described as being now abundant enough for distribution, and as having erect-growing stems and branches; oval leaves, hoary beneath and toothed at the margin; and long compact thyrsoid panicles of flowers, which open pale blue, but become deeper colored as they get older. These flowers are produced from June till October or November; and it is recommended that the plants should be cut down annually, this treatment causing them to throw up young shoots, which bear very fine panicles of flowers."—Gard. Chron., June 20, 1864, p. 579.

*" Some of the more recent French hybrids are very beautiful and appear to be all hybrids of *Azureus* and *corymbosus*."—Gard. Chron., June 30, 1877, p. 821.

céolées (très-rarement ovales), pointues dentelées, glabres aux deux faces. Panicules simples ou plus ou moins rameuses, lâches, subthyrsiformes, raccourcies, glabres.—Sous-arbrisseau haut de 1 à 2 pieds. Tiges rougeâtres, très-glabres, ordinairement rameuses. Feuilles d'un vert gai, un peu luisantes en dessus: celles des rameaux latéraux longues d'environ 2 pouces, sur 6 lignes de large; celles des tiges quelquefois larges d'un pouce. Fleurs blanches, ou, roses ou blanchâtres, plus petites que dans les espèces précédentes. Fruit semblable à celui du *Céanot glabre*.—Cette espèce, sans doute indigène dans les États-Unis, se cultive assez souvent dans les jardins. Les variétés à fleurs roses ou bleuâtres, encore peu répandues, méritent toute l'attention des amateurs, car elles sont d'un fort bel effet. Elles ont été obtenues par MM. Baumann à Bollwiller, de graines du type de l'espèce.—Spach. Hist. Nat. des Veget, ii, 460 (1834).

Ceanothus Neumanni. Tausch Dendr. ex.-boh. exs.: foliis ovatis serrulatis 3-nerviis sub-pubescentibus, thyrsis axillari-terminalibus subcorymbosis, in corymbum densum congestis, capsulis congestis rugosis 3-carinatis (majoribus).—In hortis promiscuus cum C. americano L. obvenit, qui differt thyrsis oblongis in paniculam dispositis, capsulis lævibus multo minoribus non subulato carinatis. In botanicis indefesso et amicissimo Neumann primam hujus speciei cognitionem debeo.—Flora, xxi, 1838, 738.

Ceanothus collinus. In the nursery of Messrs. Low & Co. this pretty species is at present blooming. * * * Its ovate deeply furrowed and serrated leaves are of a very symmetrical character and the flowers, which appear in terminal thyrses like those of *C. azureus*. are pure white.—Paxton Mag. of Bot. vi, 140 (1839).

Ceanothus pallidus; caule arborescente ramis ramulisque pubescentibus teretibus, foliis triplinerviis ovalibus serratis supra glabris nitidis subtùs

Ceanothus Bertini.—Très-jolie plante à feuilles relativement étroites, arrondies-obtuses au sommet, à nervures longitudinales très marquées en dessous, formant en dessus des petits sillons longitudinaux. Fleurs d'un beau bleu en épis thyrsoïdes, ordinairement ramifiés. Belle plante rustique intermédiaire entre le *C. azureus grandiflorus* et le *C. Arnoldii;* très-différente pourtant de l'une et de l'autre.—Carr, in Rev. Hort., 1872, 440.

Ceanothus axillaris.—Arbuste très-vigoureux, ramifié dès sa base. Branches subdressées, a ramifications longuement effilées, relativement grêles, obliquement étalées, á écorce rougeâtre courtement villeuse-pubérulente. Feuilles subpersistantes, atteignant 8-9 centimètres de longueur y compris le pétiole, sur 35 millimètres environ de largeur, longuement ovales-lancéolées, arrondies-obtuses au sommet, courtement dentées, glabres, et d'un vert foncé en dessus, blanches en dessous par un abondant tomentum qui en recouvre toutes les parties; pétiole court, villeux. Fleurs réunies en glomérules axillaires-sessiles, petites, d'un lilas pâle légèrement rosé.—Quand, aprés avoir lu ce qui précède, on examine la figure 14 qui représente le *Ceanothus axillaris*, et qu'on réfléchit que cette plante sort du *Ceanothus azureus grandiflorus*, l'on comprend que nous ayons encore dérogé aux habitudes suivies en botanique, de faire porter à l'enfant le qualicatif de sa mère, afin d'en démontrer l'origine. Nous aurions d'abord du ajouter un troisième qualicatif pour désigner l'enfant, ce qui aurait fait *Ceanothus azureus grandiflorus axillaris;* de plus, il y aurait eu non sens, un illogisme, ce qui, du reste, arrive presque toujours quand on veut suivre la filiation généalogique des noms qui, contraire à la marche des choses, est généralement en contradiction avec les faits. En effet, outre le port ou faciès qui diffère de celui du *C. azureus grandiflorus*, les fleurs, au lieu d'être grandes et d'un bleu d'azur foncé comme chez ce dernier, son *petites*, d'un lilas pâle légèrement rosé. La mére et l'enfant se seraient donc ressemblés, si ce n'est qu'ils aurait été complètement *différents*.—Carr. in Rev. Hort., 1876, 87.

CEANOTHUS *floribundus:* piloso-scabridus, foliis breve petiolatis oblongis coriaceis undulatis acutis margine (et paulo intra marginem) dentato-glandulosis apiceque acutiusculo reflexis subtus venosis pubescenti-tomentosis, corymbis densifloris globosis aggregatis sessilibus. DESCR. Apparently a moderately sized *shrub;* the *branches* clothed with brown *bark*, and slightly hairy: the ultimate or lateral branches short, redder and more hairy. *Leaves* crowded, small, patent or reflexed deep green, glossy hairy above, oblong, coriaceous, waved, the margin and moderately acute apex reflexed (giving a retuse appearance to the apex), the former at the very edge, and within the edge on the edge on the upper side, studded with tooth-like *glands;* the under side is pale, prominently veined and reticulated, downy. *Petioles* short, thick, hairy, with a pair of ovate tapering stipules at the base, more than half their length. Flowers of the

richest mazarine blue, arranged indeed in *corymbs*, but so crowded and so spreading as to form dense balls or *capitula*, sessile, and these crowded about the extremities of the short branches, so copious as to conceal a great part of the foliage. *Pedicels* reddish, hairy, and having small scale-like, reddish deciduous *bracts* at the base. * * * California, Lobb.—Hook. in Curtis Bot. Mag. lxxx, No. 4806, Sept. 1 (1854).

Hybrid of *C. thyrsiflorus* and *C. dentatus.*

Ceanothus *Lobbianus;* ramis patentibus teretibus, foliis elliptico-oblongis tricostatis rigidis hirsutulis marginibus recurvis grosse glanduloso-dentatis, stipulis lato-subulatis petioli longitudine, pedunculis subterminalibus nudis vel unifoliatis, racemis capitatis subrotundo ovatis, floribus densis.—Descr. A moderately-sized, erect *shrub,* with numerous patent terete rather twiggy *branches,* the young ones green and downy. *Leaves* patent, alternate, rarely exceeding an inch in length, generally bearing young leaf-shoots in the axils, on short petioles, elliptical oblong, obtuse, rigid, subcoriaceous, slightly hairy, three-ribbed, dark green above, beneath paler and downy; the margin always recurved (in cultivated as well as native specimens), and bearing numerous conspicuous spreading teeth, tipped with a gland: ribs and veins sunk above, prominent beneath. There are two broad, subulate, scale-like *stipules,* one on each side the base of the petiole, equal in length with it. *Peduncles* solitary, rather longer than the leaves, subterminal, situated in the axils of the upper leaves, terminated by a capitate *raceme* of dark blue, compact *flowers.* *Pedicils* hairy. [Description of flowers omitted].—Hook. in Curtis Bot. Mag., Oct. 1, 1854, tab. 4811—but description numbered 4810.

Hybrid of *C. thyrsiflorus* and *C. dentatus.*

cosus of the table lands of southern California and of the peninsula is like it in this respect. But *C. connivens* is nearly prostrate through mere lack of firmness or hardness in wood fibre. It, however, evinces none of the rooting and matted character of the not yet well-described but most distinct *C. prostratus*.—Along the bleak summits of the Siskiyou Mountains of southern Oregon I observed in September a Ceanothus much like this in leaf character; the stems depressed but not prostrate, less flexible and stouter. In the absence of fruit, one could not say whether it could be referred to this or whether it would be a stunted growth of *C. cuneatus* with truncate and notched leaves. The zeal and diligence of Mr. Howell, who has easier access to the region indicated, it is to be hoped may settle the question by collecting it in fruit some day.—E. L. Greene in Pitt., ii, 16 (Nov., 1889).

Ceanothus pumilus. A rigid depressed much branched evergreen undershrub, the branches often rooting at the joints and from a few inches to a foot or more in length: leaves opposite, very small (3 to 5 lines long), rigidly coriaceous, glabrous above, very minutely white-tomentose between the veins beneath; entire except at the usually 3-toothed apex, the general outline from oblanceolate to obovate-oblong: flowers in numerous sessile umbels, rather pale blue: fruit unknown.—On hillsides near Waldo, Oregon, April 1892, Thomas Howell.—E. L. Greene in Erythea i, 149 (July, 1893).

III. *Hybrids of Euceanothus with Cerastes.*

These are very rare. Only two have been observed and neither has been found a second time. Neither of them appear to set fruit. The first is almost certainly a hybrid of *C. thyrsiflorus* and *C. rigidus*. The second is without doubt a cross between *C. velutinus* and *C. prostratus*. Only one plant has been seen and the discoverer reports that it flowers very sparingly and does not fruit at all. Examination of the flowers shows that the pistils are distorted. Prof. Greene considered *C. cuneatus* to be one of the parents, which is practically impossible, as that species does not occur within thirty miles of the locality.

CEANOTHUS *Veitchianus*; ramis foliis superne petiolis, pedicellisque glaberrimis, ramulis ultimis rachique inflorescentiae tomentosis, foliis obovato-cuneatis apice rotundatis junioribus acute adultis obtuse glanduloso serratis superne lucidis (sicco opacis), venis subtus validis, areolis fimbriatis, floribus ad apices ramulorum omnium dense corymbosis v. in capitula oblonga globosa densissime confertis.—Descr. A ramous *shrub*, with terete, glabrous, green, straight branches and bright green, small, glossy leaves of very uniform size. *Leaves* shortly petioled, obovate-cuneate, rounded at the apex, margin rather distantly toothed, each tooth terminated by a deciduous gland. *Heads* of flowers one to three inches long, forming when in bud broadly ovoid cones at the ends of the branchlets, covered with imbricating, silky scales. *Rachis* stout, villous. *Peduncles* slender. *Calyx-lobes* erect or incurved, triangular. *Petals* with rather long claws, and very broadly obovate, deeply cucullate laminæ, of a bright deep blue color, as are the pedicels, calyx and stamens. Ovary depressed, three-lobed, lobes tumid at the apex. California, William Lobb.—Hook. in Bot. Mag. vol. lxxxv, t. 5124, June 1 (1859).

C. rugosus. Stems stout but pliable, prostrate, glabrous in age, the growing parts canescently puberulent: leaves coriaceous, ½–1½ in. long including the short petiole, obovate- or elliptic-oblong, acute at both ends, closely and saliently spinulose-serrate, 3-nerved, finely rugose on both faces, tomentulose beneath: fl. pale blue or white, in a short nearly simple raceme, the peduncle equaling the leaf.—Top of a high hill near Truckee, June, 1890. *Sonne.* Doubtless a hybrid of which *C. cuneatus* is one of the parents. Mr. Sonne suggests that *C. velutinus* may be the other. The young leaves are subtended by triangular-subulate stipules a line long.—E. L. Greene in Flora Franciscana, 88 (1891).

SPECIES WHICH HAVE BEEN NAMED UNDER CEANOTHUS, BUT DO NOT BELONG TO THE GENUS AS AT PRESENT LIMITED.*

Ceanothus africanus L. sp. pl. 196=*Noltea africana.*

Ceanothus Alamani DC. Prod. ii, 31=*Colubrina Alamani.*

Ceanothus capensis DC. Prod. ii, 30=*Scutia Commersonii.*

Ceanothus capsularis Forst. Prod. 18=*Colubrina asiatica.*

Ceanothus celtidifolius Ch. & Sch. Linnæa, v, 602=*Colubrina celtidifolia.*

Ceanothus chloroxylon [?][*] Nees.

Ceanothus circumscissus Gaertn. Fruct. ii, 110, t. 106 =*Scutia Commersonii.*

Ceanothus colubrinus Lam. Tabl. Encyc. ii, 90=*Colubrina ferruginosa.*

Ceanothus cubensis[†] Lam. is *Colubrina* according to Brongniart in Ann. Sc. Nat. x, 369 (1827).

Ceanothus discolor Vent. Jard. Malm. 58=*Pomaderris elliptica.*

Ceanothus elongatus Salisb. Prod. 140=*Noltea africana.*

Ceanothus ferreus DC. Prod. ii, 30=*Scutia ferrea.*

Ceanothus ferrugineus Wendl. ex Steud. Nom. ed. 2, i, 313=*Pomaderris lanigera.*

Ceanothus globulosus Labill. Nov. Holl. Pl. i, 61 t. 85 =*Spyridium globulosum.*

Ceanothus granulosus[‡] Ruiz & Pavon. Fl. Peruv. iii, 5, tab. ccxxviii.

Ceanothus Guadalupæ Steud. Nom., ed. 2, i. 313=*Ceanothus lævigatus* DC., Prod. ii, 30.

Ceanothus guineensis DC. Prod. ii, 30=*Chailletia toxicaria.*

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[*] *Ceanothus* (*Euceanothus* DeC.) *chloroxylon:* foliis ovato-subrotundis obtusis integerrimus glabris trinervibus, floribus terminalibus subcorymbosis.—Patria Jamaica. Vidi in Herb. Kunth. exempl. ex Herb. Mus. Paris. —Nees. Syst. Laur. p. 660.

[†] Ceanothus Cubensis.—C. foliis ovalibus obtusis integerrimus rugosis utrinque tomentosis, cymis axillaribus. Ex. ins. Cubæ, ♄. Rhamnus Cubensis, Lin. Jacq. hort. 3, t. 49, Dict. n. 14.—Lam. Tabl. ii, 90.

[‡] This species and *C. pubescens*, figured on the same plate, appear to be hardly distinguishable and are plainly Colubrinas.

Ceanothus Hartwegii Hook. ex Heynh. Nom. ii, 128. Name only.

Ceanothus infestus HBK. Nov. Gen. et Sp. vii, 61= *Adolphia infesta.*

Ceanothus lævigatus DC. Prod. ii, 30.

Ceanothus lancifolius Mœnch. Meth. 651=*Noltea africana.*

Ceanothus laniger Andr. Bot. Rep. t. 569=*Pomaderris lanigera.*

Ceanothus Leschenaultii DC. Prod. ii, 31.

Ceanothus macrocarpus Cav. Ic. iii, 38, t. 276 is *Colubrina.*

Ceanothus Milleri Tausch.[*] This species was founded on Miller's figure which is usually included in the synonymy of *C. Americanus.* Neither the figure itself nor Miller's description[†] applies to any species of Ceanothus. The plate represents a stout stem with leaves somewhat resembling *C. Americanus* alternate on the main stem but opposite on the branches, each branch terminated by two large opposite leaves and 3–5 dense heads, on peduncles somewhat exceeding them. The petals are figured and described as broad and plane. The fruit is represented as splitting from above downwards to the base, into three parts.

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[*] *Ceanothus Milleri* (Tau. Dendr. Ex. Boh. F. v.), foliis ovatis trinerviis serratis subtus pubescentibus, thyrsis axillari-terminalibus oblongis densis

Ceanothus Moçinianus[*] DC.

Ceanothus pauciflorus[†] DC.

The first of these two species is represented by pl. 176, showing a stout branch with spreading, somewhat recurved branchlets; leaves alternate, elliptic, entire, 1-nerved, ½–¾ inch long on petioles ¼ their length: flowers in axillary clusters shorter than the leaves, their structure undistinguishable: fruit drooping, solitary, or two in an axil, on short branching peduncles, very large (half an inch broad, and considerably longer). For the second species, pl. 175, shows a stout branch with much swollen joints and warty branches; leaves a little smaller than in the first, oblanceolate or spatulate, tapering to the base, apparently opposite and succulent, with obscure midvein and entire margin. The structure of the flowers cannot be satisfactorily made out and no fruit is shown. Both species are represented as entirely glabrous.

Ceanothus mystacinus DC. ii, 31=*Helinus scandens.*

Ceanothus napalensis Wall. in Roxb. Fl. Ind. ed. Carey ii, 375=*Rhamnus napalensis.*

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the Germen becomes a three-cornered dry Capsule, represented at *b*, being divided into Three Cells each having a single Seed, represented *c* and *d*; at *e* is shewn a Cluster of the dry Seed-vessels, as they naturally grow.

[*] *Ceanothus Moçinianus.* Foliis ovalibus integris 1-nerviis subtus ramulisque pubescentibus, pedunculis lateralibus dichotomis paucifloris. ♄. in Mexico. C. macrocarpus fl. mex. ined. [No. 176] non Cav. Calycis basis post anthesin ampliata patens.—DC. Prodr. ii, 32 (1825).

[†] *Ceanothus pauciflorus* (fl. mex. ic. ined. [No. 175]) foliis obovato-oblongis obtusis glabris integris subdentatisve, racemis lateralibus brevibus paucifloris. ♄. in Mexico.—DC. Prodr. ii, 33 (1825).

Ceanothus ovalifolius. Wender in Schr. Naturf. Ges. Marb. ii, 247.

Ceanothus paniculatus Roth. Nov. Pl. Sp. 154=*Celastrus paniculatus.*

Ceanothus pubescens. Ruiz & Pavon*

Ceanothus pubiflorus DC. Prod. ii, 30=*Zizyphus pubiflorus.*

Ceanothus reclinatus L'Herit. Sert. Angl. 6=*Colubrina*

Ceanothus Sarcomphalus DC. Prod. ii, 30=*Sarcomphalus halinus.*

Ceanothus scandens D. Dietr. Syn. Pl. i, 812=*Noltea africana.*

Ceanothus spathulatus Labill. Nov. Holl. Pl. i, 60, t. 84 =*Trymalium Billardieri.*

Ceanothus sphærocarpus DC. Prod. ii, 30=*Rhamnus sphærospermus.*

Ceanothus triflorus Steud. Nom. ed. 2, i, 313=*Colubrina triflora.*

Ceanothus triqueter Wall. in Roxb. Fl. Ind. ed. Carey ii, 376=*Rhamnus triqueter.*

Ceanothus Wendlandianus Rœm. & Schultes, Syst. v, 299=*Pomaderris ferruginea.*

OBSERVATIONS UPON THE HETEROPTEROUS HEMIPTERA OF LOWER CALIFORNIA, WITH DESCRIPTIONS OF NEW SPECIES.

BY P. R. UHLER.

A collection of Hemiptera from Lower California has been placed at my disposal for study by Dr. H. W. Harkness, President California Academy of Sciences, where the types now are. Through the zealous interest of Dr. Gustav Eisen, who made the largest part of this collection, under the auspices of the California Academy of Sciences, our knowledge of the fauna of Lower California has been greatly extended and increased. Hitherto, the collections made by Mr. John Xanthus de Vesey, Baron von Osten Sacken and Henry Edwards, have been almost the only sources of reference for information relative to the Hemiptera of that country. The assemblage of forms now known from the region near Cape St. Lucas numbers somewhat over one hundred species. Doubtless many more species will yet be secured when sufficient time can be devoted to close collecting. From the entire peninsula, including a few of the islands along the coast, as well as some of those in the Gulf of California, about three hundred species have thus far been collected. Taken as a whole, the assemblage of species is Mexican, and it forms a part of that which extends into Arizona, to which the name Sonoran has been applied. A very small percentage, embracing such forms as *Pachycoris torridus* Scop., *Pachylis gigas* Burm., and *Sphictyrtus bugabensis* Dist., which form no necessary part of the Sonoran, but which belong to an overflow of the tropical, has been made possible by the long stretch of coast, the sufficiently prolonged high temperature, and the not distant lands from which tropical forms could be readily transported. Accordingly, the writer does not regard these forms from the region of Cape St. Lucas as autocthonous, but as incidental, and not well settled. Forms affecting cacti and plants of the dry wastes hold their position to a remarkable degree; but they are so few in number as to form only a small exception to the truly indigenous fauna.

The list given below embraces all the species which have been examined by the writer from any part of the great peninsula of Lower California, excepting only such new forms as were too mutilated to be referred to their genera. About thirty species, known to me only by fragments, still remain to be recorded, among which are some interesting *Capsidæ*, collected by Dr. Edward Palmer, on the islands along the coast.

An enumeration of the well recognized species shows that the peninsula is inhabited by 5 Pachycoridæ; 6 Corimelænidæ; 7 Cydnidæ; 39 Pentatomidæ; 42 Coreidæ; 2 Berytidæ; 41 Lygæidæ; 7 Largidæ; 56 Capsidæ; 3 Anthocoridæ; 6 Tingidæ; 4 Aradidæ; 2 Phymatidæ; 20 Reduviidæ; 1 Limnobatidæ; 4 Hydrobatidæ; 6 Veliidæ; 3 Saldidæ; 3 Galgulidæ; 3 Naucoridæ; 6 Belostomatidæ; 2 Nepidæ; 6 Notonectidæ, and 5 Cor-mon species in Mexico, the West Indies, Texas and Florida.

HOMŒMUS PROTEUS Stal. A few specimens of this common Mexican insect were obtained near Cape St. Lucas by Mr. Xanthus.

ZOPHOESSA POROSA Germar. A single specimen was secured in the vicinity of Cape St. Lucas by Mr. Xanthus.

CORIMELÆNIDÆ.

CORIMELÆNA ATRA Amyot. Specimens have been collected at several localities on the peninsula by various persons.

CORIMELÆNA PULICARIA Germ. Specimens were secured near Cape St. Lucas and at San José del Cabo. It occurs from British America to Central America.

CORIMELÆNA CÆRULESCENS Stal. This species appears to be less abundant on the peninsula than the smaller ones, as specimens usually occur singly, or only in pairs, at the localities from which they have been taken. From San José del Cabo by Dr. Gustav Eisen, and from Cape St. Lucas by John Xanthus.

CORIMELÆNA LATERALIS Fab. This species spreads on the Pacific coast from British Columbia to Cape St. Lucas.

CORIMELÆNA EXTENSA Uhler. This species appears to be quite common throughout a long stretch of country extending from Vancouver Islands to Cape St. Lucas, and farther south in Mexico, on the coast of the Pacific Ocean.

CORIMELÆNA OBTUSA n. sp.

Obtusely oval, bronze-black, remotely but coarsely punctate above, strongly ciliated on the borders of the pronotum and abdomen; the scutellum much shorter than the abdomen; the propectus smooth, minutely and sparsely obsolete-punctate, with the postpectus and venter rastrate-punctate. Head tinged with cupreous purple, scabrous and coarsely punctate, except upon the convex base; antennæ with the two basal joints fulvo-testaceous, the others piceous; apex of the tylus fulvo-piceous; rostrum piceous, fulvo-testaceous upon the second joint; eyes margined interiorly with pale yellow. Pronotum transversely depressed before the humeral prominences, and excavated behind them; the surface smooth coarsely punctate, but densely and roughly punctate each side, the humeral region and posterior border almost impunctate. Scutellum bluntly rounded, smooth tinged with copper-reflections, remotely and finely punctate, indented each side near the base. Corium broad and blunt, ivory yellow, with a blackish oblong small spot before the end, placed inwardly, the surface very remotely punctate in patches, and the apex oblique, but a little curved. Legs blackish-piceous. Venter blackish, more rufo-piceous posteriorly, with the lateral margins interruptedly yellow, and the genital segments a little margined with yellow. Length to end of venter, 3 mm. Width of base of profrom the vicinity of Cape St. Lucas by Mr. Xanthus. This small insect lurks beneath rubbish in sandy places, where it matches the color of the ground and is thus easily overlooked.

TRICHOCORIS CONFORMIS Uhler. One specimen was secured near Cape St. Lucas by Mr. Xanthus, and Henry Edwards had other specimens which were collected farther north on the peninsula. A single specimen was obtained at Comondu, in March, by Mr. Charles D. Haines.

MICROPORUS TESTUDINATUS Uhler. One specimen was taken near Cape St. Lucas by Mr. Xanthus, and another was in the collection of Henry Edwards, which came from the more northern part of the peninsula of California.

MELANÆTHUS ELONGATUS Uhler. One specimen was obtained at San José del Cabo by Dr. Gustav Eisen.

HOMALOPORUS CONGRUUS Uhler. A single specimen from the northern part of the peninsula was given to me by Henry Edwards.

PANGÆUS BILINEATUS Say. A few specimens were secured by Dr. Gustav Eisen at San José del Cabo, and others were taken near Cape St. Lucas by Mr. Xanthus.

PENTATOMIDÆ.

STIRETRUS ANCHORAGO Fab. var. Specimens appear to be uncommon on this peninsula. But I have examined one obtained from near Cape St. Lucas, and another from some point farther north on the peninsula.

OPLOMUS DICHROUS H. Schf. var. A beautiful male of this species was taken near Cape St. Lucas by John Xanthus.

OPLOMUS RUTILUS Dallas, var. A single specimen of this insect, from near Cape St. Lucas, was in the collection of Mr. Henry Edwards.

PERILLUS CLAUDUS Say. I have examined specimens of this common insect which were collected in the northern part of the peninsula of California.

PERILLUS SPLENDIDUS Uhler. Two specimens of this insect were taken on the peninsula by John Xanthus.

PERILLUS VIRGATUS Stal. A specimen was in the collection from San José del Cabo, and others were collected near Cape St. Lucas, by Mr. John Xanthus.

PODISUS SAGITTA Fab. A few specimens were collected near Cape St. Lucas, by Mr. John Xanthus.

PODISUS PALLENS Stal. A single specimen was secured on the southern part of the peninsula, by Mr. John Xanthus.

PODISUS ACUTISSIMUS Stal. One specimen was captured near Cape St. Lucas, by Mr. John Xanthus.

EUTHYRHYNCHUS FLORIDANUS Linn. One adult and several larvæ were collected near Cape St. Lucas by Mr.

were collected at San José del Cabo by Dr. Gustav Eisen. It is a common Mexican form, which is found also near Cape St. Lucas and on the northern part of the peninsula.

COSMOPEPLA CONSPICILLARIS Dallas. This form occurs in the northern part of the peninsula, but no specimens were secured at Cape St. Lucas. It seems to be more common in Oregon and Washington.

ŒBALUS PUGNAX Fab. A few specimens were brought from near Cape St. Lucas by Mr. John Xanthus.

MORMIDEA PICTIVENTRIS Stal. var. The variety with small white dots is quite common at Cape St. Lucas, from which place Mr. Xanthus brought numerous specimens.

EUSCHISTUS TRISTIGMUS Say. A form of this species is distributed over various parts of the peninsula of California, even as far south as Cape St. Lucas.

EUSCHISTUS IMPICTIVENTRIS Stal. This species is also to be found as far south as to near Cape St. Lucas.

EUSCHISTUS CRENATOR Fab. This species has become settled over a wide extent of territory, but it does not seem to have yet become very common in Lower California. It is common in Brazil, Central America, the West Indies and Mexico, and southern Arizona seems to be its most northern limit in the United States.

PROXYS PUNCTULATUS Pal. Beauv. This species was collected at San José del Cabo, and Mr. John Xanthus secured a few specimens near Cape St. Lucas. It appears to be more common in the warm parts of Mexico and it is not rare in southern Florida and the Antilles.

HYMENARCYS ÆQUALIS Say. Specimens were in the collection of Mr. Henry Edwards, which were taken on some part of the peninsula not indicated. It has not been reported from Cape St. Lucas, and although found in

Mexico, it belongs rather to the highlands and more temperate parts of the country.

LIODERMA LIGATA Say. This species extends from Washington and Utah, all the way down the Pacific territory to Cape St. Lucas. It is common in Arizona and southern California, from many parts of which I have examined specimens, as also from Mexico, as far south as into Sonora.

LIODERMA VIRIDICATA Uhler. I have examined specimens from the collection of Mr. Henry Edwards, which were collected in Lower California.

LIODERMA SAYI Stal. A few specimens were collected near Cape St. Lucas by Mr. John Xanthus. Specimens were found by Mr. C. D. Haines at Comondu, Calamajuet, and on Margarita Island.

PERIBALUS LIMBOLARIUS Stal. One specimen was captured in the vicinity of Cape St. Lucas by Mr. John Xanthus. It has been brought from other parts of the peninsula by several collectors.

HOLCOSTETHUS ABREVIATUS Uhler. A single speciit has been able to hold its own in the province of Quebec, as readily as on the torrid sands of the region of Cape St. Lucas. It is almost everywhere to be found on the American continent where weeds can grow and low plants can secure a hold in the soil.

THYANTA RUGULOSA Say. Several specimens of this small form were secured at Cape St. Lucas by Mr. John Xanthus. It seems to be local, as it has not been reported from many localities in California which are similar to others from which it has been taken.

THYANTA CASTA Stal. This species is common in Mexico, California, Arizona and New Mexico. It was taken at San José del Cabo by Dr. Gustav Eisen, and likewise from the vicinity of Cape St. Lucas by Mr. John Xanthus.

THYANTA PALLIDO-VIRENS Stal. This is a Mexican insect, which was collected at Cape St. Lucas by Mr. John Xanthus.

CHLOROCORIS DEPRESSUS Fab. One specimen was secured at San José del Cabo by Dr. Gustav Eisen.

CHLOROCORIS RUFISPINUS Stal. A few specimens were collected near Cape St. Lucas by Mr. John Xanthus.

MURGANTIA HISTRIONICA Hahn. This extremely common insect has spread into vegetable gardens, and may be expected to occur on most parts of the peninsula where man has settled. I have examined specimens from Cape St. Lucas, San José del Cabo, the island of Santa Cruz, of Guadaloupe, etc., and from many parts of Central America, Mexico, California, and from the western and southern States generally.

NEZARA VIRIDULA Linn. This ubiquitous species occurs likewise at Cape St. Lucas, San José del Cabo, and on the islands of Santa Cruz and Guadaloupe.

NEZARA STICTICA Dallas. Two specimens of this fine insect were collected at San José del Cabo by Dr. Gustav Eisen, and others were found at Cape St. Lucas by Mr. John Xanthus.

NEZARA MARGINATA Pal. Beauv. This Mexican species occurs at Cape St. Lucas, San José del Cabo, etc.

BANASA CALVA Say. Specimens of this species were collected near Cape St. Lucas by Mr. John Xanthus.

B. VARIANS Stal. One specimen was secured at Cape St. Lucas by Mr. John Xanthus.

ARVELIUS ALBOPUNCTATUS De Geer. Numerous specimens of various sizes were collected by Mr. John Xanthus, at Cape St. Lucas. Two specimens of large size, from Mexico, are in the collection sent to me by Dr. Gustav Eisen.

EDESSA BIFIDA Say. A few specimens of the normal type of this insect were collected near Cape St. Lucas by Mr. John Xanthus.

COREIDÆ.

places, and which was found equally abundant near Cape St. Lucas by Mr. John Xanthus. It is said to live on various species of the cactus family.

MOZENA AFFINIS Dallas. Specimens were taken at San José del Cabo by Dr. G. Eisen, and at Cape St. Lucas by Mr. John Xanthus.

MOZENA LUNATA Burm. One specimen was found at Cape St. Lucas by Mr. John Xanthus.

ARCHIMERUS CALCARATOR Fab. Specimens were taken near Cape St. Lucas by Mr. John Xanthus. This is a widely distributed species which belongs more particularly to the temperate parts of North America. In the middle parts of the United States it occurs in most places where weeds and bushes grow thickly along the borders of woods.

SAGOTYLUS CONFLUENTUS Say. This is a Mexican insect, which occurs sparingly in Arizona and California. Mr. Henry Edwards sent to me a specimen which was obtained on some part of the peninsula not reported in his memoranda.

METAPODIUS GRANULOSUS Dallas. This large and conspicuous form is widely distributed, being found in Central America and extending north from Honduras to northern Arizona. Specimens were taken near Cape St. Lucas by Mr. Xanthus, and in the collection belonging to the California Academy of Sciences there are three specimens labelled " Texas."

LEPTOGLOSSUS ZONATUS Dallas. Specimens of this species were taken at San José del Cabo, at Comondu, in March, and at Patrocinio, in April, by Mr. C. D. Haines and by Dr. Gustav Eisen.

LEPTOGLOSSUS CORCULUS Say. A single specimen of this insect was collected near Cape St. Lucas by Mr. John Xanthus. It has also been taken in nearly all the southern and southwestern States, as well as in Mexico.

Leptoglossus stigma Herbst. A few individuals have been brought from the southern part of the peninsula by different collectors. It does not appear to be very common in any one locality, although several specimens have been brought to my notice from Cuba.

Narnia femorata Stal. Several specimens were taken at Comondu, in March, by Mr. Charles D. Haines. Others were secured at Cape St. Lucas by Mr. John Xanthus, and at San José del Cabo by Dr. Gustav Eisen.

Narnia pallidicornis Stal. A few specimens were found at Comondu and San Julio, in March and April, by Mr. Charles D. Haines.

Chelinidea vittigera Uhler. Two specimens were obtained in the vicinity of Cape St. Lucas by Mr. John Xanthus.

Margus inconspicuus H. Schf. This Mexican species was found at various points on the Peninsula of Califor-

ANASA ANDRESII Guer. A few specimens of this common Mexican and Cuban species were taken near Cape St. Lucas by Mr. John Xanthus.

ANASA SCORBUTICA Fab. Only one specimen of this Mexican and West Indian species collected on the peninsula has come to my notice, and it was found near Cape St. Lucas by Mr. John Xanthus.

FICANA APICALIS Dallas. Specimens of the nearly black variety, with the pale ring at the apex of the fourth joint of the antennæ, were taken at San José del Cabo by Dr. Gustav Eisen.

HYPSELONOTUS FULVUS DeGeer. One specimen and a larva was collected at Cape St. Lucas by Mr. John Xanthus. It is a common species in Mexico and Central America.

SPHICTYRTUS BUGABENSIS Dist. Specimens of this splendid species were collected at Cape St. Lucas, by Mr. John Xanthus, and I have examined others from Panama and Central America. I find the length of the rostrum to be quite inconstant in the specimens. In some it reaches to between the middle coxæ, while in others it extends upon the second ventral segment. The extent of red upon the head, pronotum and scutellum is also very variable. It appears to me to be only a variety of *S. sumtuosus* Stal. The black color of the tergum of abdomen is an evanescent element, depending upon the maturity of the specimen. The *S. longirostris* Dist., has a much longer rostrum, but it possesses no other permanent character to separate it from the *S. bugabensis.* More specimens are needed in order to settle the true identity of these so-called species.

BURTINUS FEMORALIS Dist. Specimens were collected near Cape St. Lucas by Mr. John Xanthus. A specimen is in one of the bottles labelled San José del Cabo. This insect agrees so nearly with darker colored specimens of *Burtinus notatipennis* Stal, from Mexico, that I take it to be the same species.

Tivarbus diversipes Hope. One specimen is in the collection made by Dr. Gustav Eisen, at San José del Cabo. Others were secured at Cape St. Lucas by Mr. John Xanthus. It is a common Mexican species.

Tollius curtulus Stal. This is a common insect in parts of southern California. A specimen was found near Cape St. Lucas by Mr. John Xanthus.

Leptocorisa filiformis Fab. This widely distributed species seems to be common near Cape St. Lucas, where it was taken by Mr. John Xanthus.

Dasycoris nigricornis Stal. Specimens were captured near Cape St. Lucas by Mr. John Xanthus.

Ceraleptus americanus Stal. Specimens were taken at San Jose del Cabo, by Dr. Gustav Eisen, and others were found by Mr. John Xanthus near Cape St. Lucas.

in many parts of California, Arizona, New Mexico and Colorado. I have seen many specimens from various parts of Lower California. It was taken on Margarita Island and at San Julio by Mr. C. D. Haines.

CORIZUS SIDÆ Fab. A few specimens were collected near Cape St. Lucas by Mr. John Xanthus. Others were secured at Patrocinio, Comondu and Calmalli mines by Mr. C. D. Haines.

CORIZUS LATERALIS Say. Common in various parts of California. Specimens were taken at Cape St. Lucas by Mr. John Xanthus; and at San Julio, in April, by Mr. C. D. Haines.

CORIZUS NIGRISTERNUM Signoret. Common in south ern California and Arizona. Specimens from Lower California were sent to me by Mr. Henry Edwards.

CORIZUS VALIDUS Uhler. One specimen was taken at San José del Cabo by Dr. Gustav Eisen.

CORIZUS PUNCTIVENTRIS Dallas. A few specimens of this species were collected near Cape St. Lucas by Mr. John Xanthus.

CORIZUS new sp.? A specimen too poor to describe is in the collection from San José del Cabo. It seems to be closely related to *C. punctiventris* Dallas.

LEPTOCORIS TRIVITTATUS Say. This species inhabits most parts of lowland California, and is common in Arizona, New Mexico and on the plains of Colorado, as far north as Denver. Mr. John Xanthus captured specimens of it near Cape St. Lucas.

JADERA HÆMATOLOMA H. Schf. This is a subtropical species which inhabits Central America, Mexico, the West Indies, Texas and southern Florida. Specimens of it were taken at Cape St. Lucas by Mr. John Xanthus.

BERYTIDÆ.

Neides muticus Say. This very slender species inhabits many parts of the region near the coast of the Pacific Ocean. Mr. John Xanthus secured specimens of it near Cape St. Lucas. As this is is a highland species which extends north into British Columbia, it is inferred that it was found in the mountains inland from Cape St. Lucas.

Acantholæna annulata Uhler. This neat little species was found at San Borgia, in May, by Mr. C. D. Haines. Collections made in the early summer would, no doubt, add other tropical species to those already recognized, especially among the forms which inhabit damp places and the fresh or brackish waters.

LYGÆIDÆ.

Nysius californicus Stal. The specific name here given is unfortunate, for this insect inhabits all the herbaceous regions from Central America to British Columbia, and from New Jersey to Florida and Cuba. Specimens were secured by Mr. John Xanthus at Cape St. Lucas.

line each side next the eyes, and with a few slender black borders of the sutures; the tylus and a line of corresponding width behind it blackish; labrum pale brown, the rostrum piceous and reaching to behind the middle coxæ; antennæ brownish testaceous, obscured with fuscous above, and more especially upon the basal and apical joints. Pronotum wider than long, pale brownish, a little tinged with fulvous, deeply punctate in blackish, somewhat transversely, in confluent rows, the lateral margin slenderly reflexed, diagonal in a direct line, which is interrupted behind by the over-swelling of the end of the callosities; callosities blackish, the constriction before them pale fulvous, sunken and very minutely punctate, the middle line black raised, and a trace each side also black; humeral angles tumid, oblique, pale, punctate in part. Scutellum roughly punctate, the raised y-shaped line blackish, with a testaceous tip. Prostethium chiefly dull black, punctate, margined behind with testaceous, the meso- and meta-sternum black, and this color is carried over upon the basal segment of the venter; the pleural segments and first ring of venter each with a large black spot exteriorly, the osteolar piece ivory white. Legs fulvo-testaceous, the femora faintly flecked with brown. Hemielytra pale testaceous, remotely and finely punctate; the costal margin strongly reflexed, moderately carinate; the veins thick, the inner and apical bounding veins of the clavus each with a dark piceous streak, and the radial and discoidal veins with a larger dark streak on the middle of each, the posterior border with three dark brown streaks. Venter with three yellow spots each side which are bordered with black.

Length to end of abdomen, 2¾–3 mm. Width of pronotum, 1 full mm.

Several specimens were taken at San Julio, in April, by Mr. C. D. Haines.

Ischnorhynchus didymus Zett. Specimens of this cosmopolitan species were found by Mr. Xanthus in the region of Cape St. Lucas. It is common in many parts of California.

Ischnoryhnchus championi Dist. One specimen was obtained at San José del Cabo by Dr. Gustav Eisen. It has also been taken at Cape St. Lucas and in southern California.

Cymus luridus Stal. Specimens from Cape St. Lucas have been brought to my notice.

Cymodema tabida Spin. Two specimens were taken at San Ignacio, in April, by Mr. C. D. Haines.

Ischnodemus falicus Say. A few specimens of this insect were taken near Cape St. Lucas by Mr. John Xanthus.

Blissus leucopterus Say. Specimens of the usual varieties were collected at Lower Purisima, in April, by Mr. C. D. Haines.

Geocoris punctipes Say. Specimens were captured [redacted]

LIGYROCORIS CONSTRICTUS Say. Specimens were found at the same localities as the preceding species.

CNEMODUS SOBRIUS n. sp.

Stouter than the other described species of this genus. Piceous black, not highly polished, rufo-piceous beneath. Head thick, closely pubescent and set with numerous long bristles, the antenniferous lobes stout and prominent; tylus acutely prominent, fulvo-testaceous, with the rostrum a little paler, reaching between the middle coxæ; the eyes placed a little farther back than in *C. mavortius*, base of head almost abruptly contracted. Pronotum only moderately long, contracted into a narrow, striated collum on the front margin, the anterior subglobose, but longer than wide, with a few scratched spots on the disk, and set with a few erect bristles; the posterior lobe much wider than the anterior, rufo-testaceous, remotely punctate, with the humeri callous and pale. Breast and underside of head a little scabrous, the sternum, coxæ and legs castaneous, with the femora darker, the front tibiæ of the male a little curved, armed on the middle with a stout tooth, and with a few smaller teeth towards the tip. Hemielytra nearly flat, pale castaneous, coarsely and remotely punctate throughout, the costal margin paler, widely reflexed, a little curved; the cuneous yellowish with a black spot at tip; the membrane and adjoining border black. Scutellum long, narrow, acute, blackish piceous, remotely and finely punctate, with the extreme tip pale testaceous. Venter mostly rufous, or rufo-piceous, tergum dark piceous.

Length to tip of abdomen, 7½ mm. Width of base of pronotum, 1¾ mm.; width of anterior lobe, 1½ mm.

One specimen from Lower California was sent to me by Mr. Henry Edwards. Several specimens in the collection of the California Academy of Sciences are labeled "Cal. 7."

All the specimens which have thus far been reported have the membranes short and unfinished, leaving the two apical rings of tergum exposed.

PAMERA BILOBATA Say. A specimen is in the collection secured at San José del Cabo by Dr. Gustav Eisen. It is not rare in Mexico and California.

PAMERA NITIDULA Uhler. Two specimens were taken at San José del Cabo. Mr. John Xanthus found it near Cape St. Lucas, and in my collection there are specimens from Arizona and Texas.

OZOPHORA BURMEISTERII Guerin. This is a West Indian species which is somewhat common in Mexico and Central America, and which is now known to inhabit Lower California.

OZOPHORA UNICOLOR n. sp.

Dark brown, broader than usual, almost flat on the hind lobe of the pronotum and the hemelytra. Head short, strongly convex, rufescent along the broadly grooved with an indented spot between them, and with the surrounding surface punctate; collum contracted, distinct, posterior lobe distinctly, not closely, punctate, the lateral margins curved and expanding posteriorly, a little contracted next the anterior lobe, the edge strongly reflexed, and the humeral callosities prominent, pale, and long, the posterior margin a little waved, faintly testaceous. Scutellum mostly impunctate, but closely punctate exteriorly. Legs and coxæ dusky fulvous, the anterior femora long and straight, armed with but a few slender spines, tibiæ of the same legs long, straight, slender, armed with long spines and bristles and with two stout spines at tip. Hemielytra dark clear brown, the corium punctate in lines, the clavus and the costal areole more coarsely and deeply punctate, costal margin to beyond the middle, base of ulnar vein and outer margin of clavus pale testaceous, membrane fuliginous, bordered with testaceous at base. Middle of venter pale reddish brown.

Length to tip of venter, 8–8½ mm. Width of base of pronotum, 2–2¼ mm.

A few specimens were collected at San José del Cabo by Dr. Gustav Eisen, and others were brought from Cape St. Lucas by Mr. John Xanthus.

PTOCHIOMERA OBLONGA Stal. Single specimens have been picked up at several stations near the southern part of Lower California.

CARPILIS FERRUGINEA Stal. One specimen was captured near Cape St. Lucas by Mr. John Xanthus.

SCOLOPOSTETHUS sp.? A single specimen was secured near Cape St. Lucas by Mr. John Xanthus, but it is too much altered to be fit for description.

TRAPEZONOTUS NEBULOSUS Fallen. A few specimens of this common European insect were captured near Cape St. Lucas by Mr. John Xanthus.

EMBLETHIS ARENARIUS Linn. A specimen is in the collection from San José del Cabo, and some others from the Calmalli mines.

PERITRECHUS FRATERNUS Uhler. This species was found near Cape St. Lucas by Mr. John Xanthus.

EREMOCORIS FERUS Say. One specimen was collected at San José del Cabo by Dr. Gustav Eisen. Others were found near Cape St. Lucas by Mr. John Xanthus.

MEGALONOTUS UNUS Say. A single specimen of this obscure species was secured near Cape St. Lucas by Mr. John Xanthus.

MICROTOMA CARBONARIA Rossi. This European species is now known to be widely distributed on both sides of North America. It occurs in Massachusetts and extends from thence to Florida. On the western side it is found in Colorado, near Denver, and from that point southwest, at various stations, to Arizona, California and Lower California. It was also collected at El Paraiso by Dr. Gustav Eisen.

PHYGADICUS BEHRENSII Uhler. Specimens were se-lateral margins of the posterior lobe of the pronotum and sometimes the posterior part of the medial carinate line red. Head moderately long, subacute, minutely and obsoletely scabrous, very minutely pubescent; antennæ stout, finely pubescent, the second joint long, about equal to the fourth, the third short and a little longer than the basal joint; rostrum reaching the posterior coxæ. Pronotum depressed behind the collum, and back of the curved impressed line between the lobes, the callosities almost obsolete, the lateral margins prominently elevated and growing thicker posteriorly, the medial carinate line sharply defined; the anterior lobe remotely and more coarsely punctate, and the posterior lobe obsoletely and more finely so. Scutellum with a thick scabrous raised line on the middle. Hemielytra densely and minutely scabrous, with the veins of the corium and its claval boundary thick and very prominent. Collum of the prosternum notched in the middle. Underside rendered a little grayish by the minute sericeous pubescence; the legs tinged with gray in the same manner. Venter a little tinged with red along the connexivum. Membrane smoke black.

Length to tip of venter, 5½–8 mm. Width of base of pronotum, 2–3 mm.

This species closely resembles *Lygæus lateralis* Dallas, as figured by Mr. Distant in the Biologia Cent. Amer., plate 18, fig. 1. But the figure seems to give a much narrower insect with longer head, corium bordered with red, and joints of antennæ relatively longer.

Numerous specimens were collected at Cape St. Lucas by Mr. John Xanthus. Another was secured at San José del Cabo by Dr. Gustav Eisen.

MELANOCORYPHUS CIRCUMPLICATUS Dist. A single specimen of this species was found at Lower Purisima, in April, by Mr. Charles D. Haines. It is No. 484 of the collection.

LYGÆUS BISTRIANGULARIS Say. Specimens were collected at the Calmalli mines, in April, by Mr. Charles D. Haines.

LYGÆUS RECLIVATUS Say. Several specimens were collected at Comondu, San Fernando and San Quentin, in March and May, by Mr. Charles D. Haines. It is also in the collection from San José del Cabo secured by Dr. Gustav Eisen.

LYGÆUS COSTALIS H. Schf. Specimens have been brought in from nearly every part of Lower California. It was collected at San José del Cabo by Dr. Gustav Eisen, and at Comondu, Calmalli mines and San Jorge, in March and April, by Mr. Charles D. Haines.

LYGÆUS TURCICUS Fab. A few specimens of this form were included in a large bottle of *L. reclivatus* Say, which were collected near Cape St. Lucas by Mr. John Xanthus. These two so-called species are but forms of a true single species for which the name *Lygæus turcicus* Fab. has priority. It is convenient, however, to label them with the two names in our cabinets, since the westors or form have yet been published. It is interesting to record that melanism is quite common in specimens from Washington State, and that I have seen a few from Vancouver in which the two white spots were exceptionally large and convergent on the inner sides.

ONCOPELTUS FASCIATUS Dallas. Specimens were collected at San José del Cabo and other stations by Dr. Gustav Eisen, and Mr. Charles D. Haines found it at the Calmalli mines in April. Mr. John Xanthus secured numerous specimens at Cape St. Lucas, and it has been taken at many localities in Lower California.

ONCOPELTUS GUTTA H. Schf. This form is moderately common in many parts of Lower California. It was found at San José del Cabo and other stations by Dr. Gustav Eisen, and at San Quintin in May by Mr. Charles D. Haines. Mr. John Xanthus collected many specimens of it near Cape St. Lucas.

ONCOPELTUS CINGULIFER Stal. This is a common Mexican and Central American species. It was collected at San José del Cabo by Dr. Gustav Eisen, and at Cape St. Lucas by Mr. John Xanthus.

PYRRHOCORIDÆ.

ACINOCORIS LUNATUS Hahn. A dwarf specimen of this curious insect was taken at Cape St. Lucas by Mr. John Xanthus.

LARGUS LONGULUS Stal. One specimen was secured at Cape St. Lucas by Mr. John Xanthus.

LARGUS CONVIVUS Stal. Numerous specimens were captured at San José del Cabo and at other stations by Dr. Gustav Eisen. Mr. John Xanthus secured many specimens of it near Cape St. Lucas. Mr. Charles D. Haines also found it at Comondu in March.

Largus cinctus H. Schf. This common Mexican insect was collected near Cape St. Lucas by Mr. John Xanthus.

Stenomacra marginella H. Schf. This species extends from Arizona through California to southern Mexico. One specimen was found near Cape St. Lucas by Mr. John Xanthus.

Dysdercus mimus Say. One specimen was secured near Cape St. Lucas by Mr. John Xanthus. It extends through Arizona into Mexico, and is common in many parts of the last-named country.

Dysdercus obliquus H. Schf. Only a single specimen has come to my notice from Lower California. It was sent to me by Mr. Henry Edwards. Numerous specimens of it have been collected in southern Mexico, and it is not rare in the vicinity of Orizaba.

CAPSIDÆ.

Megaloceræa debilis Uhler. A few badly damaged specimens were brought from Lower California by Dr. Edward Palmer.

Resthenia circumcincta Say. Fragments of a specimen of this species were in a bottle from Cape St. Lucas secured by Mr. John Xanthus.

Resthenia divisa H. Schf. A variety of this species, from some unrecorded part of Lower California, was given to me by Mr. Henry Edwards.

Resthenia latipennis Stal. One specimen was found near Cape St. Lucas by Mr. John Xanthus.

Oncerometopus nigriclavus Reut. Specimens of this insect were taken at San José del Cabo by Dr. Gustav Eisen. It spreads through the Southern States west of Texas and Arizona, and from thence into Mexico and Lower California.

Lopidea media Say. A few specimens of this widely distributed form were collected near Cape St. Lucas by Mr. John Xanthus.

Lopidea marginata n. sp.

Form rather more slender than in *L. media* Say. Bright red, almost parallel-sided. Head narrow, with the vertex short and moderately convex, black on the middle, or with a double, black curved mark there. Antennæ black, very slender. Eyes brown, subglobose, very prominent. Costal margin of corium and cuneus pale yellow. The other features and form of the pronotum are the same as in *L. media* Say. The legs, membrane and disk of corium blackish.

Length to tip of venter, 4½–5 mm. Width of pronotum, 1⅓–1⅔ mm.

A few specimens were collected at San Julio, in April, by Mr. C. D. Haines. It inhabits also California, Arizona, Colorado and the eastern United States.

Possibly this may eventually prove to be but a form of

L. media Say, but at present we have no evidence upon which to establish this possibility.

LOMATOPLEURA CÆSAR Reut. Specimens of this insect have been secured in many parts of California, as well as in the eastern United States. A damaged specimen was in the collection made at Cape St. Lucas by Mr. John Xanthus. The fusiform second joint of the antennæ will distinguish this from the similar species in the genus Lopidea.

HADRONEMA ROBUSTA n. sp.

Shorter and more convex anteriorly than *H. militaris* Uhler. Black, tinged with gray by the sericeous minute pubescence; the pronotum, scutellum and breast bright red. Head dull black, nearly vertical, strongly convex above; rostrum black, reaching between the posterior coxæ; antennæ short and stout, black, the second joint very long, the third about two-thirds as long, while the fourth joint is very short, acute at tip. Pronotum wider than long, a little sinuated on the sides, minutely scabrous, transversely and finely wrinkled, with the anterior margin

July 9th, was given to me Mr. Henry Edwards. I have also seen specimens from Los Angeles, San Bernardino and other parts of California. The male is far more slender than the female, and has very prominent eyes and longer antennæ. The macropterous male has sometimes exceptionally long hemielytra.

Hadronema princeps Uhler from nothern California, Oregon and Washington State, is of a narrow form, with nearly the same colors, antennæ more slender and reaching upon the cuneus, besides having a slender yellow costal border and a lunule of yellow or red on the cuneus.

HADRONEMA MILITARIS Uhler. One specimen from Lower California was given to me by Mr. Henry Edwards. It is also found in Arizona, Mexico, etc.

HADRONEMA DECORATA n. sp.

Dull black, minutely pubescent, broader than either of the other species. Head wide, moderately convex, acutely triangular in front, sometimes rufous or fulvous at base, also next the eyes, middle of front, the cheeks and throat; eyes very large and prominent, smoke-brown or black, vertex finely pubescent, minutely scabrous; antennæ long, tapering, but not abruptly narrowing, black, the second joint long, the third a little shorter, the fourth more than half the length of the third; rostrum black, sometimes fulvous at base, reaching between the middle coxæ. Pronotum about as long as wide, moderately convex, slenderly reflexed on both the anterior and lateral margins, the surface obsoletely or little punctate and transversely wrinkled, the callosities transverse, small, black, sometimes enclosed by a pale band which crosses the anterior lobe, the posterior margin a little curved down, with the humeri a little tumid. Scutellum a little swollen, rufous, scabrous. Legs black, with a tinge of grey, or dull tawny at base, and sometimes with the coxæ pale testaceous. Propleura and prosternum pale yellowish. Hemielytra dull black, flat, minutely pubescent, faintly scabrous, the costal margin almost straight, narrowly yellow in concurrence with the border of the pronotum, the inner edge of the clavus, a wider line running diagonally back to the inner angle of the corium and the clavus, bluish white; membrane long, smoke-black. Venter black, a little polished, much narrower and shorter than the hemielytra, finely pubescent, the exterior margin white, and the base with a subquadrate white spot.

Length to tip of venter, 3½–4 mm. Width of base of pronotum, 1¼–1½ mm.

A few specimens were collected at San Luis and at the Calmalli mines, in April, by Mr. C. D. Haines. Nos. 756, 777 and 554. The males are very much narrower than the females, and this gives greater apparent amplitude to the wing-covers. Immature varieties have much of the black color above substituted by a pale lead-color, and the legs more or less fulvous or testaceous. Two specimens were taken at San José de Gracias.

joint paler, minutely bristly, a little longer than the clavus, the third joint scarcely more than half as long; rostrum pale fulvous, darker at tip, reaching to the posterior coxæ. Pronotum short and very convex, infuscated each side and across the base, the callosities dark brown, transverse, wide apart, the surface minutely pubescent, and the posterior edge yellow, curved, indented in the middle and next the humeral angles; the pleural flap dusky, broadly pale beneath. Anterior coxæ pale yellowish, the femora pale fulvous, a little sprinkled with brown, especially towards the tips, tibiæ paler, set with pale bristles; tarsi dark at tip including the nails. Scutellum tumid, indented at base, bright fulvous. Hemielytra bright fulvous, long, not much curved on the costal margin; cuneus of the same color; membrane yellowish white, spread with branching brown lines on the sides and tip, the looped vein deep yellow. Venter a little dusky on the disk, sometimes pale fulvous sprinkled with rufous.

Length to tip of venter, 4½–5 mm. Width of pronotum, 2 mm.

One specimen was taken near Cape St. Lucas by Mr. John Xanthus. In the present collection there are a few specimens marked Cal. 11, and I have examined others which were collected at San Bernardino, Los Angeles and at Flagstaff, Arizona.

COMPSOCEROCORIS ROSEUS n. sp.

More slender than the preceding species, with the outer margin of the corium nearly straight; color roseus, or pale yellow tinged with rufous. Head moderately long, very convex, finely hoary pubescent, distinctly contracted into a neck behind the eyes, the eyes large and very prominent, dark brown; rostrum slender, pale yellow, reaching over the second ventral segment. Antennæ long and slender, black, the basal joint crossed on the upper side by numerous irregular white bands; the second joint much narrower than the first, with a white band at base and another beyond the middle; the third almost setaceous, white at base, a little shorter than the second; the fourth still shorter and a little more slender; border of the antennal sockets black. Neck with two black stripes each side behind the eyes. Pronotum long and narrow, very moderately convex, more or less luteous, or with the posterior lobe entirely luteous, obsoletely and most minutely scabrous, remotely pubescent; the collum distinct, the anterior lobe but little wider than the collum and not much longer, with an indistinct carina on the middle; the posterior margin very slightly sinuated, fringed with whitish hairs; the pleural flap pale and reflexed below. Legs pale testaceous, the anterior and middle femora flecked with black near the tip, posterior femora pale fulvous, or rosy, minutely flecked with brown over most of the surface, and more distinctly pubescent; tibiæ with the knees, tip and two bands black, tarsi mostly piceous, with the nails black. Scutellum pale fulvous, tumid, finely whitish pubescent. Hemielytra luteous, tion was kindly sent to me from Los Angeles by Mr. D.W. Coquillett.

NEUROCOLPUS NUBILUS Say. Syn. *N. mexicanus* Dist One specimen was taken at Cape St. Lucas by Mr. John Xanthus. A single specimen in the collection of the California Academy of Sciences is marked "Cal. 9."

This species is one of the most variable of the inconstant Phytocoraria. It is distributed all over the North American continent from Quebec to Panama, and it seems to be about as variable in Mexico as it is in Maine or Maryland. As I have compared specimens with Mr. Distant's types, I find them to be precisely like varieties of *N. nubilus* Say, which I have collected with my own hands, and some of which I have raised from the newly excluded condition to the fully matured state. A permanent variety has the posterior femora dark gray, with a small pale spot on the upper side. The other extreme of color has the hind femora yellowish or fulvous, with the apex broadly black. The basal joint of the antennæ is also variable in thickness. In some specimens the tip of this joint is knobbed and smooth.

CALOCORIS SUPERBUS Uhler.

This common species occurs near Cape St. Lucas, as well as in Mexico and the western United States.

CALOCORIS RUBRINERVE Dist. This is a common species in Mexico, southern Florida, Texas and the Lesser Antilles. Specimens were found at Lower Purisima in April, and on Margarita Island in March, by Mr. C. D. Haines.

CALOCORIS VIGENS n. sp.

Clear green, opaque, more robust than *C. rubrinerve*, minutely pubescent. Head greenish-yellow, almost vertical in front, the eyes moderately prominent, dark brown, placed nearly vertical, vertex broadly grooved on the middle, transversely impressed between the upper corners of the eyes; the front tumid, subpentagonal, nearly flat on the middle, the outline strongly curved when viewed from the side; the sockets of the antennæ seated in a cavity. Antennæ long and slender, the basal joint longer than the pronotum, the second longest, as long as the clavus, the third not much more than half as long, the fourth more slender and a little shorter than the third. Rostrum slender, pale greenish, dusky at tip, reaching behind the middle of venter. Pronotum wider than long, paler anteriorly, the collum prominent, confined to the width between the eyes, callosities oval, low, tinged with reddish-brown, the posterior margin broadly curved, a little uneven, with the humeral angles a little reflexed and the adjoining surface indented; the surface uneven around the callosities, pale pubescent near the sides, the lateral margin not distinctly carinated, very slightly sinuated; lower margin of pleural flaps pale, reflexed. Chest and venter greenish-white, silky pubescent. Legs yellowish, the femora a little dusky near the tip, with the nails black. Scutellum green, a little convex, sometimes red at base, MELINNA ELONGATA n. sp.

Resembling *M. modesta* Uhler, male, in form, but narrower than any other species yet described, pale chestnut-brown, sometimes fulvous, distinctly pubescent. Head narrow, eyes large, black, far apart, face vertical, vertex very short, minutely punctate, antennæ stout, long, extending to the base of the cuneus, the second joint almost as long as the third and fourth united, the fourth piceous. Rostrum pale luteous, darker at tip, reaching to the posterior coxæ. Pronotum short, moderately convex, closely punctate, clothed with erect, yellowish pubescence, breast paler. Legs pale honey-yellow, the coxæ almost white, with a brown spot above each. Scutellum very moderately convex, pubescent, closely punctate. Corium, clavus and cuneus unevenly punctate, clothed with erect yellowish pubescence, the costal area nearly straight, wide, pale luteous, the cuneus mostly rufous. Venter pale fulvous, polished, pubescent, with bundles of longer hairs at tip. Membrane with a large dusky spot at tip.

Length to tip of venter, 2–2½ mm. Width of pronotum, ¾–1 mm.

One specimen was taken near Cape St. Lucas by Mr. John Xanthus; another was secured at the Calmalli mines in April (No. 759), by Mr. C. D. Haines. It inhabits also Texas, Arizona, California and Florida.

MEGACŒLUM CATULUM n. sp.

Dull testaceous, mixed with gray pubescence, and marked with black, oval, broader than the related species of this genus and the surface more opaque. Head blunt, vertical, dull testaceous, the vertex a little depressed and sloping forward, incised on the middle, the front almost vertical, fuscous at base, marked before the base with diagonal lines of dark brown punctures, which converge on the sunken and punctate middle line, the lower part of this surface punctate generally, and the base of the tylus also punctate as above; occiput acute-edged; the eyes large, pale, placed nearly vertical, sinuated inwardly, with very coarse facets. Antennæ stout, so closely sprinkled with piceous as to appear blackish, the basal joint stouter and nearly all black, the second joint longest, about as long as the clavus, the third a little longer than the basal one and the fourth a little shorter than the basal, very acute at tip. Rostrum mostly dull testaceous, piceous at base, reaching between the middle coxæ; the tylus white from near base to next the tip, the base and tip marked with black. Pronotum convex, the outline concurring with the oval curve of the hemielytra, the surface irregularly and deeply punctate, having a large subquadrate black spot anteriorly which includes the convex callosities, the transverse impression deep, sunken in the middle; collum narrow, deeply contracted, marked with a small black knob in the middle; lateral carina very slender, pale, slightly sinuated posteriorly, a little reflexed next the humeri; more or less spotted with black near the posterior margin. Scutellum polished, black, with brown, darker behind the middle and on the nervule. Venter highly polished greenish-yellow, freckled with red, the submargin with a broad black stripe which sends off slender streaks on the borders of some of the segments; connexivum broadly red interrupted with black at the sutures, minutely shagreened, the apical segments set with erect hairs.

Length to tip of venter, 5–6 mm. Width of pronotum, 2–2¼ mm.

Only three specimens of this insect have thus far been brought to my notice. They are all females, and differ in the depth of color and amount of marking upon the upper and under surfaces. One specimen was taken near Cape St. Lucas by Mr. John Xanthus, a second was found in southern Texas by Mr. Andrew Bolter and the third was secured in York County, Pa., by Dr. F. E. Melsheimer.

The insects of this genus occur on the branches and twigs of young pine trees in early summer; and it is likely that this new species will be found in moderate numbers when attention is paid to collecting from the young pine trees. The male is now a desideratum. The tibiæ of this species are sometimes marked with three whitish incomplete bands.

Lygus sallei Stal. This is a common species which includes several varieties. It has been found in Texas, Colorado, Arizona, California and in Mexico, as far south as Orizaba. One or two damaged specimens are in the collection from San José del Cabo. Several specimens are labeled " Cal."

Lygus pratensis Fab. This species has been widely dispersed through the agency of commerce. It is found at the seaports of every part of North America, on the west as well the east; and it is now distributed over the whole width of the continent from the mouth of Mackenzie River in Arctic America to Panama and northern Brazil. It dwells on weeds and grasses of many kinds. Mr. John Xanthus brought specimens from Cape St. Lucas, and in the present collection there are specimens labeled "Cal. 2" and "Cal. 9."

Lygus vividus n. sp.

Elongate suboval, bright tender green, beneath greenish-white, minutely pubescent. Head yellow, nearly vertical, short, blunt, polished, longitudinally indented anteriorly; eyes large, black, prominent, with coarse facets, the space between them narrow; the tylus thick, moderately curved, the rostrum yellow, reaching to behind the middle coxæ. Legs pale luteous, finely pubescent, the posterior femora thick, somewhat flattened, obsoletely bicarinated beneath; the nails and tip of tarsi dark piceous. Pronotum convex, short, with the anterior lobe, collum and margins all around, yellow, indented space between the callosities slightly carinate across the front, the collum cylindrico-convex, almost in contact with the corner of

A single male from Comondu (No. 318) was obtained by Mr. C. D. Haines, in March, 1889. The only other specimens that I have examined were collected in southern California; they were, however, too much damaged to afford characters for description. This type of structure is exceptional in the genus Lygus, and when specimens of both sexes can be obtained for dissection, it is possible that this species will have to be transferred to another genus. It has several characteristics which recall relationship with the genus Orthotylus.

LYGUS sp.? Fragments of four other species, apparently undescribed, are known from Cape St. Lucas and other parts of Lower California, but they do not afford sufficient materials for description.

ORTHOPS SCUTELLATUS Uhler. Specimens were collected near Cape St. Lucas by Mr. John Xanthus. The species is distributed over many parts of the West, including California, Arizona, Colorado, Illinois, Minnesota and Canada.

PŒCILOSCYTUS BASALIS Reuter. This species occurs on small plants in various parts of California, Arizona, Texas and Colorado, as well as in most parts of the eastern United States. A few specimens were collected near Cape St. Lucas by Mr. John Xanthus. In the present collection there are specimens from California.

PŒCILOSCYTUS INTERMEDIUS n. sp.

A little more robust than *P. basalis* Reuter, with stouter antennæ; oval, pale brownish-yellow or chestnut-brown, minutely pubescent. Head a little oblique, highly polished, luteous, with a black circle on the face between the eyes which is interrupted below, but carried back posteriorly to the base of the head, below this the tylus is deep black, except at base; cheeks below the antennæ bright yellow, highly polished, swollen; front set with erect yellowish hairs; occipital carina narrow, dull yellow, black in the middle; rostrum slender, piceous at base and tip, reaching between the middle coxæ. Pronotum convex, dark brown, bronze pubescent, often bordered posteriorly with yellow, and with an oblong dull yellow spot on the middle, collum more or less dull yellow, the surface scabrous and transversely wrinkled, the posterior margin regularly curved. Scutellum dark brown, pubescent, wrinkled, broadly yellow at tip. Legs dull yellowish, the two anterior pairs of femora paler, crossed by about two piceous bands, the posterior femora crossed by broader and darker bands, tibial knees and apex of tarsi blackish piceous. Hemielytra pale dull tawny or obscure chestnut-brown, with the costal margin and cuneus pale yellow, the base of corium shaded and streaked with pale dull yellow, the coarse vein of inner apical margin next behind the clavus conspicuously yellow; the surface mostly covered with prostrate bronze-yellow pubescence; membrane dusky, with the veins yellow. Sternal and pleural pieces black above and between the coxæ, PŒCILOCAPSUS MARMORATUS n. sp.

Pale yellow, short, moderately robust, hardly polished, very minutely scabrous, most minutely and remotely pubescent. Head polished, impunctate, nodding, strongly convex in front, with the eyes quite small, pale brown, tylus long, tapering, continuing almost the same curve as the front; antennæ moderately slender, long, rod-shaped, and very gradually tapering after the apex of the second joint, dark brown, the basal joint longer than the head, marked with several irregular or diagonal yellow bands, the second joint as long as the clavus, about uniformly thick throughout, crossed by a narrow yellow band before the middle, the third and fourth joints short, subequal, each with a narrow whitish band at base; rostrum pale yellow, very slender towards the tip, reaching beyond the posterior coxæ, a little piceous both at base and tip. Pronotum a little wider than long, convex, marbled with dark brown on the sides and posterior two-thirds, the lateral margin slenderly carinate, with a slender brown line on it and another above it, collum narrow but clearly defined, bounded before and behind by a slender brown margin, on the middle behind the callosities are two round, brown dots, humeral angles more projecting than the lateral margin, the posterior margin a very little curved, but bending down towards the scutellum; pleural flaps quite narrow, scabrous. Legs yellow, the femora flecked with brown, and the tibiæ with the knees, two bands and the tip also brown, apex of the tarsi, and the nails piceous. Scutellum moderately convex, usually marked with two longitudinal brown streaks, the tip minutely acuminate. Underside whitish yellow. Hemielytra pale luteous, spread with close golden-yellowish pubescence, irrorated and marbled with brown in such a way as to leave numerous dots and irregular spots of the surface exposed, the base of cuneus occasionally almost covered by one or two brown patches, also the tip and middle with brown streaks; the membrane pale, marked with a smoky bord, band and base, the veins coarse, and yellow excepting the base. Venter with two submarginal curved, very slender, interrupted stripes of red. The dark color is sometimes concentrated against the tip of the corium and the base of the pronotum.

Length to tip of abdomen, ♂, 4¼; ♀, 4¾–5 mm. Width of pronotum, 2–2¼ mm.

This beautiful little species was found at San José del Cabo by Dr. Gustav Eisen. Fragments of specimens from Texas and Maryland have been for a long time in my collection, but not in condition for identification. It mimics in markings of thorax, and somewhat in figure, certain varieties of Phytocoridæ related to *P. colon* Say.

NEOBORUS SAXEUS Dist. Specimens in this collection are marked "Cal. 9." A specimen more closely resembling the variety described by Mr. Distant was taken by Mr. John Xanthus near Cape St. Lucas. This insect presents all the varieties of color and marking possible to

Camptobrochis nebulosus Uhler. Two specimens are in the collection, marked "Cal. 4." A few specimens were found near Cape St. Lucas by Mr. John Xanthus. This species is now known from most parts of North America. It is distributed from Quebec to northern Florida, and on the Pacific side of the continent it has been found in British Columbia, Washington State, and from thence to San Bernardino, California, and farther south.

Deræocoris cerachates n. sp.

Broad ovate, more deeply convex than usual, form nearly like *Camptobrochis nebulosus* Uhl., but much larger; honey-yellow, polished, closely and unevenly punctate, many of the punctures brown. Head highly polished, strongly convex, of medium length, sloping obliquely, with the tylus continuing the curve of the front and distinctly cut at base; antennæ slender, the second joint a little longer than the pronotum, black and slightly thickened at tip, the remaining joints short, yellow, the fourth about of the same length as the first; rostrum reaching over the posterior coxæ; the occipital collar very small and almost hidden. Pronotum wider than long, very convex, deeply, coarsely deeply and unevenly punctate, dark honey-yellow or fulvous, clouded with fuscous across the base, and with a slender dark submarginal line, the callosities smooth impunctate, swollen, dark brown, collum wide, depressed, whitish-yellow, with the posterior margin white and sinuated in the middle. Pectoral segments, sternum and legs uniform pale honey-yellow. Scutellum unusually swollen, highly polished, impunctate, with the basal angles and tip pale yellow. Hemielytra deeply but not closely set with brown punctures, the apex of clavus, and disk, and apex of the corium broadly, irregularly brown, the costal margin with a slender brown line, and the raised lines mostly pale yellow; cuneus orange, tipped with clear brown; membrane pale smoky with the veins yellow at base and brown at tip. Venter rufo-fulvous, with an arcuated dark brown band before the middle.

Length to tip of venter, 5–5½ mm. Width of pronotum, 2¼–2¾ mm.

This species is not rare at Los Angeles and various parts of southern California. A single specimen (♀) of the large variety was secured at San José del Cabo by Dr. Gustav Eisen.

THYRILLUS gen. nov.

General aspect of Rhopalotomus; hairy, head thick, nearly vertical, the face prominently tumido-convex, the throat swollen, the eyes projecting laterally and superiorly, vertex somewhat depressed above, having a short broad middle groove, the occipital carina rising high above the surface of the vertex, the base of antennæ placed some distance below the eyes, with the basal joint but very little thicker towards the apex, the second joint long and rod-shaped and the following joint not abruptly more

THYRILLUS PACIFICUS Uhler. The specimens in this collection are labeled "Cal. 9." A few broken specimens from Lower California were given to me by Mr. Henry Edwards. This species seems to be fairly common at Los Angeles, San Bernardino and in the neighborhood of San Francisco. I have also seen a few specimens from southern Nevada, and others from Yakima, Washington.

THYRILLUS BRACHYCERUS Uhler. This is also a common insect in various parts of California. One specimen is in the bottle labeled San José del Cabo, and it was collected by Dr. Gustav Eisen. Other specimens in the collection are labeled "Cal. 9." Both of these species were placed in the genus Rhopalotomus when first described, but they seem to constitute a new genus, for which the above name is proposed.

PYCNODERES QUADRIMACULATUS Guerin. This is a common insect which inhabits sandy localities on both sides of the North American continent south of the latitude of New Hampshire on the east, and probably of San Francisco on the west. It occurs, also, in Cuba and other islands of the West Indies. A single specimen was taken near Cape St. Lucas by Mr. John Xanthus.

CYRTOCAPSUS CALIGINEUS Stal. One specimen was taken near Cape St. Lucas by Mr. John Xanthus. The species is widely distributed in California, and it appears to be moderately common in the vicinity of San Francisco.

MALACOCORIS IRRORATUS Say. A soiled and damaged specimen (No. 755) of this common insect is in the collection which was made at Calmalli mines, in April, by Mr. Charles D. Haines.

Ilnacora chloris Uhler. Formerly placed in the genus Sthenarops Uhler, which genus is now seen to be preoccupied by Ilnacora Reuter. It is No. 744 of the collection from San Julio, and it was secured in April by Mr. Charles D. Haines.

Labopidea chloriza Uhler. An unusual variety of this species (No. 665) was found at San Esteban, in April, by Mr. Charles D. Haines. Most likely this specimen was found in the highlands of the region, since the species has previously been known from the mountains and hills of Washington State and remote northern parts of the northwest.

Stiphrosoma atrata n. sp.

This species is closely related to *S. stygica* Say, deep black, polished, closely and mostly roughly punctate; base of head not so strongly grooved as in the species of Say, the antennæ are more slender, deep black, excepting only the immediate points of articulation, which are indistinctly pale; the legs are black, excepting only the very tip of femora and the base of tarsi, which are testa-

MALTHACUS n. sp.?

A pair of these insects are in the collection labeled "Cal. 2," but they are too much altered to bear description.

ONCOTYLUS GUTTULATUS n. sp.

Pale whitish or yellowish-green, robust, form of a stout *Lygus;* the upper surface distinctly pubescent, minutely flecked with black, which is finer and closer on the corium, but forms remote round dots on the head, pronotum, legs and antennæ. Head small, pale green, the vertex and front conformly convex, the tylus continuing the curve, tapering toward the tip; the basal joint of antennæ short, second joint rod-shaped, about as long as the inner margin of the clavus; rostrum reaching upon the middle coxæ, pale testaceous, piceous at tip. Pronotum strongly convex, moderately polished, a little wider than long, not obviously punctate, a little wrinkled next the humeri, the callosities very large, tumidly convex, transverse, the middle line obsoletely carinated with an indent at the front of the line on the margin, the humeri broadly rounded; the lateral margins almost directly oblique, sharp-edged. Scutellum moderately convex. Hemielytra remotely, finely and obsoletely punctate, the costal margin very feebly curved, with the veins prominent, and the area a little deflexed; the membrane whitish, clouded unevenly with fuliginous behind the middle and towards the tip. Tibiæ pale yellowish with numerous streaks and a few dots black.

Length to tip of venter, 4½–4¾ mm. Width of pronotum, 2 mm.

Several specimens, all more or less damaged, are in the collection. They were collected at San Julio in April, and El Rosario in May, by Mr. Charles D. Haines. There is much difference in the amount of spotting upon the hemielytra and pronotum.

ONCOTYLUS PUBERUS n. sp.

Delicate green, brighter in the male, all above closely sericeous pubescent, the females often have the dorsum beneath base of pronotum fulvous or rosy. Head short, almost vertical, the eyes large and very prominent, front moderately convex, often rufous, vertex a little depressed, transversely impressed next the very high occipital carina; the tylus very thick and prominent; rostrum reaching between the middle coxæ, pale testaceous; antennæ thick, yellowish, pubescent, the second joint nearly as long as the outer margin of the clavus. Pronotum wider than long, depressed behind and each side of the distinct callosities; lateral margin with a thick feebly sinuated carina, the humeral margins indented, a little rounded. Scutellum very feebly elevated, depressed across the exposed base, a little scabrous, pale yellowish pubescent. Hemielytra darker green, closely yellowish pubescent, obsoletely scabrous; the cuneus long and subacute, coarsely wrinkled; membrane translucent, yellowish-white, closely wrinkled. Legs pale greenish-yellow, the tibiæ armed with long spines. Beneath pale dull yellowish or greenish-white, with the mesosternum more or less one suborbicular, hairy prominence, of a fuscous color. which extends from behind the middle of the eyes to their lower line; the neck of medium length, bounded anteriorly by a row of black bristles, sides of the head more or less infuscated, erect pubescent; tylus long, fuscous; eyes prominent, dark brown, placed almost vertical; rostrum pale greenish, dusky at base and tip, reaching upon the first ventral segment; antennæ moderately stout, blackish, pale at the joints, the first joint short, the second a little shorter than the anterior tibiæ. Pronotum trapeziform, almost flat above, the sides distinctly sinuated, obliquely narrowing towards the front, with the edge clearly carinated; the surface either yellow or green, set with black bristles, the transverse line distinctly depressed, with two subquadrate dark spots behind it, which cover most of the posterior lobe, the callosities distinct, large, oval, prominent, brown. Scutellum yellow, set with blackish bristles, feebly convex, the base exposed and marked with fuscous. Legs greenish, blackish above and dotted on the sides of the femora, the tibiæ mostly blackish. Clavus fuscous and together with the corium spread with erect black hairs, corium greenish, the costa, a diagonal stripe on the middle and an uneven band at tip blackish; cuneus pale greenish-yellow, sparsely set with dark hairs, the inner basal angle with a small triangular black spot; membrane dusky, the vein greenish-yellow. Venter and pleural segments green, the apex of the venter sometimes blackish.

Length to tip of venter, 2¾–3 mm. Width of base of pronotum, 1¼ mm.

Specimens in this collection are labeled "Cal. 9." A damaged specimen from Lower California was sent to me several years ago by Mr. Henry Edwards.

MACROTYLUS VERTICALIS n. sp.

More ovate, shorter and convex than the preceding species, with no contracted neck behind the eyes, pale yellowish testaceous, minutely and closely pubescent. Head short, very moderately convex, with a brown oval mark on the face, which is sometimes broken; eyes larger than in the preceding species, brown; tylus and cheeks black, polished; rostrum piceous at base and tip, reaching between the posterior coxæ; the throat and bucculæ testaceous. Pronotum convex, a little longer than wide, with the anterior lobe more fulvous, and the callosities sometimes darker, pubescence of the sides longer and blackish. Base of scutellum exposed, and yellow in each angle. Legs testaceous yellow, sometimes dusky, dotted with black. Hemielytra sometimes a little greenish testaceous, pubescent like the pronotum, the middle of cuneus more or less dusky, and the membrane dusky or clouded, with the vein pale. Middle of pleural flap in front of depression, upper angle of mesopleural piece, and upper end of middle and posterior coxæ polished black. Venter dusky, yellow at tip, and with a bright yellow spot on the border of each of the segments.

the sides, base of vertex a little bluntly arched, the face marked with an uneven, curved, black line each side of the middle; the tylus moderately long and tapering, with a black line each side; tip of suture between the cheeks also black; the rostrum slender, reaching to the posterior coxæ, piceous at base, and the two apical joints piceous; the eyes large, dark brown, prominent, almost in contact with the pronotum; the antennæ stout, black, with the second joint nearly as thick as the short first joint, and not quite as long as the clavus, the third more slender, and about half as long as the second. Pronotum short and wide, trapezoidal, a little sinuated at the side of the front lobe, the callosities large, connected, prominent, deeply impressed behind, yellow, with a black dot each side, and the suture more or less black; surface dusky, clothed with erect blackish hairs. Scutellum black, pubescent, having a yellow stripe on the middle. Legs yellow, speckled with black, and with black spines, knees, and tarsi. Sternum and pleural segments yellow, with a black bead-like spot at the upper end of each coxæ and of two lateral orifices. Hemielytra dull blackish, minutely yellowish pubescent, with the costal margin, an oblique line next inward which forks at the posterior end, another oblique line parallel with the clavus, the posterior border of the corium, and the border all around the cuneus pale yellow; the costal margin moderately curved; membrane smoke-blackish, with the veins pale yellow. Venter yellow, with a submarginal curved line of black dots along its length.

Length to tip of venter, 5 mm. Width of pronotum, 2¼ mm.

One specimen is in the collection, labeled "Cal. 10."

Fragmentary specimens have passed my inspection, which were taken at San Bernardino, and at Cape St.

Lucas by Mr. John Xanthus. It is quite desirable to have series of these insects, since the full characters of the species cannot be well known until both sexes have been carefully examined.

Fulvius anthocoroides Uhler. Specimens have been brought from Los Angeles and San Bernardino, and from Cape St. Lucas by Mr. John Xanthus. This species is now known from many places on both sides of North America. It is also found in the West Indies, Central America and Mexico.

Closterocoris ornatus Uhler. This is a common species in many parts of California and Arizona. Two specimens were secured at San Quintin, in May, by Mr. C. D. Haines. Others are labeled "Monterey Co., Cal., M. K. Curran." Other specimens are labeled "Cal. 2 and Cal. 9."

Dicyphus californicus Stal. Numerous specimens are in the collection, and from various localities. A series is labeled "Cal. 2 and Cal. 9." One or two specimens were in the bottles from San José del Cabo, collect-

AGALLIASTES DECOLOR Uhler. Two specimens of this inconspicuous little species were collected near Cape St. Lucas by Mr. John Xanthus.

PSALLUS DELICATUS Uhler. Several specimens were collected at the Calmalli mines in April by Mr. C. D. Haines.

PSALLUS BIGUTTULATUS n. sp.

Yellowish-white, milk-white on the membrane, with two small angular black spots on its exterior border; the surface finely pubescent. Head subtriangular as seen from above, smooth, yellow, moderately convex, directed obliquely, the eyes long, brown, placed almost vertically; the tylus parallel-sided, a little curved; antennæ short, slender, black, the basal joint short, white, with a subapical band and exterior stripe black; rostrum testaceous, tinged with fulvous, reaching between the intermediate coxæ. Pronotum wider than long, moderately convex, the lateral margin sinuated, reflexed, the anterior margin very delicately reflexed and notched in the middle, the outer border of the callosities posteriorly with an indented line, humeral angles subacute, a little granulated, bordered inwardly by a depression, the posterior margin almost straight. Scutellum almost flat, a little punctate, and obsoletely carinate on the middle line. Legs whitish-yellow, with a very slender black line on the femora and tibiæ. Clavus and corium obsoletely punctate in longitudinal series. Beneath whitish, unpolished.

Length to tip of venter 3½ mm. Width of pronotum 1¼ mm.

Specimens were collected at the Calmalli mines in April, at El Paraiso in May, and on Margarita Island in March by Mr. C. D. Haines. The antennæ are incomplete in all the specimens examined.

PSALLUS GUTTULOSUS Reuter. One specimen, No. 804, was taken at San Fernando in May by Mr. C. D. Haines.

PSALLUS n. sp.?

Two specimens, No. 307, from Comondu, March, were collected by Mr. C. D. Haines. The condition of the insects would give only misleading characters for description.

Several other species related to Psallus are in the collection from Lower California, but they do not furnish proper material for description.

A most interesting and peculiar type of Capsid, related to Pilophorus, is in the collection and labeled "Cal. 9." It seems important to add a description of it in this article, since the same insect, or one much like it, was collected in Lower California by Mr. John Xanthus.

MYRMECOPSIS n. gen.

In form much resembling the common black Formica which inhabits the wood of trees in the eastern United States. Head long, thick, almost vertical, much thicker than the swollen middle of the pronotum; the front continuous with the vertex, and both occupied by a broad trum broad at base, the basal joint remote from the throat and scarcely extending beyond the middle of the throat, remaining joints very slender, not extending beyond the posterior coxæ; the throat deep and the upper cheeks long and triangular. Pronotum curved upwards, subcylindrical, but swollen on the middle and much contracted behind this swelling, the middle of posterior margin very prominently reflexed-folded, so as to leave an acute notch there, surmounted by a thick spine. Hemielytra beginning very narrow, gradually widening posteriorly and finishing in a bluntly rounded tip, coriaceous, closely pubescent, with the basal vein gradually spreading away from the costal as it proceeds backwards. Legs long and rather stout. The abdomen inflated beyond the contracted base.

MYRMECOPSIS INFLATUS n. sp.

Formiciform, piceous-black, dull, not apparently punctate. Head long and thick, subconical at lower end; antennæ rufo-fulvous, blackish on the apical third of the second joint. Rostrum reaching to the posterior coxæ, piceous at base and tip. Pronotum blackish-piceous, tinged with rufo-castaneous beneath and in front, medial hump curving diagonally upwards and forwards, the depression behind it deep and the flexure of the posterior border almost abrupt, the posterior edge white, with the spine black. Legs dull rufo-castaneous, with the femora somewhat darker. Hemielytra velvety blackish-brown, pale lead-color at base and along the inner border, the membrane pale, with an ivory-yellow border at base. Venter piceous-black, with a large angular white patch at base.

Length to end of venter 6 mm. Width of base of pronotum 1 mm.

This wonderful insect deserves to be studied to discover its habits. That it should be so much like an ant without requiring the protection suggested by such mimicry is well worthy of ardent attention.

ACANTHIIDÆ.

Anthocoris antevolens B. White. A few specimens were secured at Cape St. Lucas by Mr. John Xanthus. It is in the collection from some other part of California, but it is a widely-distributed form which is known from various parts of Arizona, Mexico and southern California.

Triphleps tristicolor B. White. Several specimens were collected at the Calmalli mines and on Margarita Island in March and April by Mr. C. D. Haines. No. 742, three specimens from San Quintin, are too much deformed to be recognizable.

Acanthia lectularia Linn. The common bed-bug is distributed in Lower California as actually as it is in Mexico and California farther north.

TINGITIDÆ.

Piesma cinerea Say. One specimen from Lower California received from Mr. Henry Edwards. The

CORYTHUCA DECENS Stal. A specimen was taken at Comondu, in March, and another at San Luis, in April, by Mr. C. D. Haines.

CORYTHUCA HISPIDA n. sp.

Dull white, with the eyes and body black, the antennæ a little lurid yellow, and darker at tip. Pronotal hood long, tapering rapidly toward the front, with comparatively long spines all over, pointing in all directions, provided with mostly circular small cells, the anterior division separated from the globose base by an abrupt constriction; the lateral lamellæ bean-shaped, mostly opaque, but with small circular cells, separated anteriorly from the hood by a narrow triangular space, the surface and particularly the margins armed with mostly close-set spines. Scutellum with the medial carina low, armed with spines pointing outwards from both sides, as is the case with the reflexed outer margins. Hemielytra comparatively narrow, with three rows of circular variable cells between the discoidal flexed carina and the outer border, the costal margin set with long straight spines which decrease in length near the tip, these continue to within three cells of the tip; discoidal carinate bulla low, spread with about four rows of almost quadrangular cells. Legs fulvo-testaceous.

Length to apex of hemielytra, 2¾–3 mm. Width across pronotal lamellæ, 1⅔ mm.

This novel species was taken at San Esteban, in April, by Mr. C. D. Haines.

CORYTHUCA CÆLATA n. sp.

White, mostly translucent, the pronotal lamellæ, the discoidal area with the globular bullæ and the hood opaque. Antennæ a little dusky, with the apical joint fuscous. Pronotum with the hood moderately short, compressed and narrow anteriorly, not high, carrying about three series of cells, anterior part of carinate ridge with erect spines, sides with shorter spines, the posterior globular portion not much wider than the division next in front of it; lateral lamellæ almost triangularly narrowed anteriorly, reaching forward almost as far as the tip of the hood, areoles small, arranged in four series, margined along the full length with straight, long, nearly equidistant spines, the posterior margin not far from the front border of the hemielytra. Base of mesonotum like a transverse, interrupted collar, with the middle between the swellings longitudinally carinate, the space each side of this, the hollows at base of hood, the center of bulla on the disk of hemielytra, and the veins of the marginal cells black. Scutellum almost flat, with the middle carina thicker than the marginal ones. Hemielytra a little wider behind, somewhat bent outwards, with six rows of chiefly quadrangular cells; the base a little wider than the lamellæ, deeply notched in the middle, armed with spines which gradually decrease in size until arrested at about one-third from the tip. Legs, rostrum, bucculæ, occupying nearly all of it, the cells very large, chiefly hexagonal, above stained with dark brown; lateral lamellæ short, sunken and with a brown spot anteriorly, bent upwards posteriorly, the edge with very short, close set spines. Scutellum simple at base and brown there, the carinate middle line high, with a brownish spot each side. Hemielytra with large, mostly subquadrangular areoles, the outer border deeply sinuated, the costal row of cells stopped at one-third from the tip, and the very minute spines hardly extending that far, base feebly notched; the inner margin, a band before the apex, and the bullate portion of the disk brown. Antennæ, excepting the dark apical joint, the rostrum, bucculæ, and legs testaceous. Apical third of the venter rufous.

Length to tip of hemielytra, 3 mm. Width of pronotal lamellæ, 1⅓ mm.

This speciës is labeled in the collection "Cal. 7."

It is, however, an inhabitant of Lower California, Mexico and Arizona.

ARADIDÆ.

ARADUS AMERICANUS H. Schf. One specimen is in the collection which was made at Cape St. Lucas by Mr. John Xanthus.

ARADUS ÆQUALIS Say. A single specimen is in this collection, labeled "S. Cal." It has been taken at Cape St. Lucas and on the island of Santa Cruz.

ARADUS LUGUBRIS Fallon. This species has also been taken at Cape St. Lucas and in Mexico.

BRACHYRHYNCHUS EMARGINATUS Say. Specimens were collected at San José del Cabo, by Dr. G. Eisen; and near Cape St. Lucas, by Mr. John Xanthus.

PHYMATIDÆ.

PHYMATA FASCIATA G. R. Gray. *P. Wolffii* Stal. *(syn.)* This species is now distributed over the greater part of North America. Doubtless it has been distributed by hurricanes and less violent storms of wind from region to region, and through the distribution of garden plants by commerce it has unquestionably been transported to distant localities. At length it may be expected to occur wherever roses and herbaceous garden plants shall be carried from North America.

Specimens were collected on Magdalena Island, also in Siskiyou County and in southern California.

In the eastern United States as well as in Colorado, Kansas, etc., it enters between the florets of the golden rod and the heads of other flowers, where it matches the pollen-spread surfaces, and seizes the unwary insects which come within its reach.

REDUVIOIDEA.

CORISCUS FERUS Linn. This species is dispersed throughout almost every region of North America. It is defined, and the knobs each side of base elevated, and surmounted by a little tubercle; three double series of spine-like, black tubercles on the anterior lobe of the pronotum. Venter with a series of oblique, white spots on each side near the border; scallops of the lateral border more prominent and placed further back than in *S. diadema;* the inner margin of corium white.

Length to tip of venter, 14–15 mm. Width of pronotum, 3 mm.

This appears to be a common species in southern California and in Lower California. Specimens were collected at San José del Cabo, and at the Calmalli mines by Mr. C. D. Haines.

PRIONIDUS CRISTATUS Linn. One or two specimens were collected at San José del Cabo by Dr. Gustav Eisen.

HEZA ANNULICORNIS Stal. One specimen was taken near Cape St. Lucas by Mr. John Xanthus.

ROCCONOTA sp.? Fragments of a large fuscous species, apparently of this genus, were sent from Cape St. Lucas by Mr. John Xanthus.

MILYAS ZEBRA Stal. A mutilated specimen of this insect is in one of the bottles from San José del Cabo.

ZELUS SPECIOSUS Burm. A specimen was taken by Dr. Gustav Eisen at San José del Cabo. Mr. John Xanthus captured several specimens at Cape St. Lucas.

DIPLODUS RENARDII Kolenati. Specimens were taken at Comondu by Mr. C. D. Haines.

DIPLODUS EXSANGUIS Stal. A few specimens of this insect were captured at Cape St. Lucas by Mr. John Xanthus.

PINDUS SOCIUS Uhler. This species was also found at Cape St. Lucas by Mr. John Xanthus.

APIOMERUS CRASSIPES Fab. Specimens in this collection are labeled "S. California." I have examined a variety of this species from Cape St. Lucas.

APIOMERUS FLAVIVENTRIS H. Schf. This species is in the collection of the California Academy of Sciences, labeled "Mex." It is a well-known Mexican species, which inhabits Cape St. Lucas, southern California and Arizona.

RASAHUS BIGUTTATUS Say. This is a common species in California and Mexico, which extends as far south as to the vicinity of Cape St. Lucas. It was taken at San Luis by Mr. C. D. Haines.

RASAHUS SULCICOLLIS Serv. This species was found at Cape St. Lucas by Mr. John Xanthus.

MELANOLESTES PICIPES H. Schf. A few specimens of this insect were found at Cape St. Lucas by Mr. John Xanthus.

MELANOLESTES ABDOMINALIS H. Schf. This species and coarsely granulated; rostrum thick, fuscous, closely pubescent, reaching to the middle of the prosternum. Pronotum obsoletely rugose, narrower than in *C. rubrofasciatus*, less deeply sinuated on the sides, and having the carinate line closely uniting with the humeral tubercle, coarsely and obsoletely punctate. The scutellum moderately granulated on the carinate flaps. Corium minutely pubescent, very finely and closely scabrous. Venter but little wider than the corium, with the notches of the segments marked by a pale streak; underside paler brown, minutely wrinkled. Tarsi and end of tibiæ dull pale fulvous.

Length to tip of venter, 16–17 mm. Width of pronotum, 3–3½ mm.

Two specimens are labeled "Cal. 11." One specimen from Lower California (Santa Cruz?) was sent to me by Dr. J. L. Le Conte. It is common at San Diego, southern California.

CONORHINUS RUBIDUS n. sp.

Narrow, a little wider than the preceding species, with a long narrow head and prominent eyes, dark smoke-brown, with the basal part of pronotum and the outer part of the connexivum more or less widely red, or reddish, and with the costal margin red, but more broadly so at base. Head subcylindrical, the anterior portion not tapering, rugulose; antennæ thick, longer than in the preceding species, the basal joint just reaching to the apex, second joint longer than in *C. protractus*, the two apical joints also long, obscurely testaceous, space behind the eyes almost smooth, the constricted neck red; rostrum short, chestnut-brown, banded with white at the joints, reaching to middle of the short prosternum, ciliated with long hairs. Pronotum short and moderately wide, obsoletely wrinkled and roughened, the anterior lobe short, simply a little convex on each division separated by the longitudinal deep line, with the carinate longitudinal lines divaricating and subobsolete; lateral margin distinctly constricted and a little sinuated behind the anterior lobe, with the exterior margin carinated and the carina extending along the outside of the humeral tubercle. Scutellum filled up in the middle, coarsely transversely wrinkled, with the tip acutely protracted, long, and rufous. Corium very minutely scabrous, with a short pale streak on the middle of the posterior border; veins of the membrane blackish on a pale brown surface. Feet and tip of tibiæ pale dull fulvous. Abdomen broadly bordered with red both above and below, incisures of the tergum more or less red; the margin not covered by hemielytra narrow.

Length to tip of venter, 19–21 mm. Width of pronotum, 4–4⅔ mm.

A few specimens were collected at Cape St. Lucas by Mr. John Xanthus.

CONORHINUS MAXIMUS n. sp.

Coal black, shining, narrower than *C. dimidiatus* Lat.

coarse grains, the posterior lobe thick and wide, coarsely and unevenly wrinkled in several separate divisions, the divaricating lines almost obsolete; the lateral border thick, broadly curved, coarsely tuberculated below the slender, waved carina, the humeral tubercle long, tumid, absorbing the lateral carina; posterior margin almost straight and abruptly steep against the base of scutellum, each side of this obliquely curved. Scutellum coarsely knobbed at base, more finely towards the tip, deeply scooped out, the apical portion narrow, subcylindrical, ending in a knoblike tip. Corium minutely scabrous, and the clavus more coarsely so. Abdomen long ovate, wider than the wing-covers, but not broadly expanded, with the margin bright red all around; venter highly polished, transversely wrinkled.

Length to tip of venter, 35 mm. Width of pronotum, 8½ mm.

Only one specimen, a male, has thus far been brought to my notice. It was kindly given to me by Dr. George H. Horn, as having been taken in Lower California. It differs from all species known to me by having the outer edge of the connexivum thickened, not sharp-edged, as is common to the large Mexican forms.

STENOPODA CULICIFORMIS Fab. Specimens were captured at Cape St. Lucas by Mr. John Xanthus.

EMESA LONGIPES DeGeer. Several specimens of this insect were secured at San José del Cabo by Dr. Gustav Eisen. After careful comparison of several specimens with my types from the eastern United States, I can find no important differences to separate them.

Specimens were secured also at Cape St. Lucas by Mr. John Xanthus.

LIMNOBATIDÆ.

Limnobates lineata Say. One specimen of this form was brought from Cape St. Lucas by Mr. John Xanthus.

HYDROBATIDÆ.

Hygrotrechus robustus Uhler. Specimens of this species were captured at San José del Cabo by Dr. Gustav Eisen; others were taken at El Paraiso, Comondu and San Jorge, in March, by Mr. C. D. Haines. A few others in the collection were taken at other localities in California. Numerous specimens were secured near Cape St. Lucas by Mr. John Xanthus.

Hygrotrechus n. sp.?

A single damaged specimen was in the set from Cape St. Lucas. It appeared to be near *H. remigis* Say, but its identity could not be established from such meagre material.

Limnotrechus marginatus Say. Specimens of this species were taken near Cape St. Lucas by Mr. John Xanthus. It is found also near San Diego, Los Angeles and at other localities in southern California.

sect; the color is a dark brown, with more or less bluish bloom, and minutely pubescent. Head short subconical, with a smooth grooved line on the middle; antennæ russet-brown, paler towards the tip, the joints long; rostrum dull testaceous, dark at tip, reaching behind the anterior coxæ. Pronotum moderately long, convex, feebly sinuated on the sides, the anterior submargin with a bright orange band which does not reach the sides; sternum and pleural segments dark plumbeous, bordered with testaceous. Legs pale testaceous, obscured above with fuscous, and the tarsi more or less fuscous. Hemielytra velvety, long, and much narrower than the pronotum, clavus with a white streak, corium with a longer white streak at base which grows wider posteriorly, the membrane long, marked with one or two faint spots near base, with a clear long spot beyond and another, longer, near the tip. Venter dull yellow, brighter on the connexivum, and dusky along each side of disk.

Length to tip of venter, 3 mm. Width of pronotum, 1⅓ mm.

This beautiful little species was taken at San Esteban, in April, by Mr. Charles D. Haines.

MACROVELIA HORNII Uhler. One specimen was secured near Cape St. Lucas by Mr. John Xanthus. It is a common insect in southern California and Arizona.

MESOVELIA BISIGNATA Uhler. Specimens were collected at Lower Purisima, in April, by Mr. C. D. Haines.

VELIA STAGNALIS Burm. This Mexican species was brought from the vicinity of Cape St. Lucas by Mr. John Xanthus.

RHAGOVELIA OBESA Uhler. Specimens were found near San José del Cabo by Dr. Gustav Eisen, and others were taken near Cape St. Lucas by Mr. John Xanthus.

SALDIDÆ.

SALDA INTERSTITIALIS Say. Specimens were collected at Cape St. Lucas by Mr. John Xanthus.

SALDA PALLIPES Fab. One specimen is in the bottle from San José del Cabo; and there are others in the collection labeled "Cal. 2."

SALDA EXPLANATA Uhler. I have examined specimens from Lower California, kindly sent to me by Mr. Henry Edwards. In the collection there are a few specimens labeled "Cal. 2."

GALGULIDÆ.

GALGULUS OCULATUS Fab. Numerous specimens have been brought from Cape St. Lucas; and the insect is in one of the bottles from San José del Cabo, collected by Dr. Gustav Eisen. This insect inhabits nearly the whole continent of North America. How such a clumsy and merely leaping insect could become distributed so generally, beyond mountain ranges and at various altitudes, northern limit of distribution is about the latitude of Wilmington, N. C. On the Pacific slope it has not yet been reported from as far north as San Francisco.

NAUCORIDÆ.

AMBRYSUS SIGNORETII Stal. This is a common species in Arizona and California, especially in the vicinity of San Bernardino and Los Angeles. One specimen was secured at Lower Purisima, in April, by Mr. Charles D. Haines.

AMBRYSUS PUDICUS Stal. Specimens were collected at San José del Cabo by Dr. Gustav Eisen. It occurs also at Los Angeles and San Bernardino.

PELOCORIS FEMORATA Pal. Beauv. This widely distributed species was taken at San Ramundo and at San Ignacio, in April, by Mr. C. D. Haines. It is common on both sides of the continent, from Canada to Florida, and from thence into the Antilles and Mexico.

BELOSTOMATIDÆ.

BELOSTOMA ANNULIPES H. Schf. A pair of these insects was secured near Cape St. Lucas by Mr. John Xanthus. Specimens in this collection of the California Academy were taken in the vicinity of San Francisco.

ZAITHA ANURA H. Schf. Specimens were collected at San José del Cabo by Dr. Gustav Eisen, and at Cape St. Lucas by Mr. John Xanthus.

ZAITHA FUSCIVENTRIS Stal. This common Mexican species was found at Cape St. Lucas by Mr. John Xanthus. Specimens in this collection are labeled "Cal. 2."

ABEDUS OVATUS Stal. Several specimens were secured at San José del Cabo and other parts of the peninsula by Dr. Gustav Eisen; and Comondu, in March, by Mr. C. D. Haines.

Pedinocoris macronyx Mayr. A few specimens have been brought from various parts of Lower California by different collectors.

Serphus dilatatus Say. Several specimens were secured at Santa Maria and San Fernando, in May, by Mr. C. D. Haines.

NEPIDÆ.

Ranatra quadridentata Stal. Several specimens of this form were taken at San José del Cabo by Dr. Gustav Eisen; and at Comondu, in March, by Mr. C. D. Haines.

Ranatra fusca Pal. Beauv. A specimen of this species was secured at Comondu, in March, by Mr. C. D. Haines.

NOTONECTIDÆ.

Notonecta mexicana Am. et Serv. Numerous specimens of several varieties were taken at Comondu and El Paraiso, in March, April and May, by Mr. C. D. Haines.

Notonecta undulata Say. Several specimens of this insect were collected near Cape St. Lucas by Mr.

carinated on the middle, the occiput bordered with a thick carinate edge; the inner submargin of the eyes marked by a line of punctures which terminate in a group set in an oval fossa near the lower end of the eye; the clypeus distinctly, obliquely depressed each side of the ridge-like tylus and sparsely punctate and wrinkled there; the basal margin of the eyes almost truncate; the apical joint of rostrum dark piceous. Pronotum obsoletely impressed across the middle, transversely indented behind the vertex and remotely punctate there, behind this the surface is more or less wrinkled; the lateral impressed submargin punctate, and the margin strongly reflexed and a little curved, the anterior angle subacuminately produced; the humeral margin long, a little sinuated. Scutellum and hemielytra covered with prostrate bronze-yellow pubescence. Legs greenish yellow, with the nails and incisures of the joints, the spines, and some minute specks on the femora and tibiæ, black; femora and tibiæ with some obscure stripes; the middle coxæ and pectoral segments more or less black. Ventral segments broadly bordered with black, this color sometimes expands into spots on the connexivum, and each side of the middle line.

Length to tip of venter, 8–9 mm. Width of pronotum, 4½–4¾ mm.

One specimen was found at San José del Cabo by Dr. Gustav Eisen. The types were found near San Diego, October 19, by Mr. Shooter, to whom I take great pleasure in dedicating this species. Specimens have since been found at Los Angeles by Mr. Coquillett.

Anisops elegans Fieber. A few specimens were collected at Cape St. Lucas by Mr. John Xanthus.

Anisops sp.? A specimen of unusually large size was taken at Comondu, in March, by Mr. C. D. Haines.

CORISIDÆ.

Corisa abdominalis Say. This species was found at Comondu, in March, and at El Paraiso, in May, by Mr. C. D. Haines.

Corisa inscripta n. sp.

Elongate, with a short head and long, nearly triangular pronotum, the ground color pale dull testaceous marked with dark brown very slender short lines in uneven longitudinal series. Head highly polished, moderately convex, a little triangularly expanded against the pronotum, with the occipital submargin linearly impressed, and the middle acuminate; middle of vertex of female with a few scattered punctures and a feebly elevated longitudinal line; face a little hairy, a little depressed in the female, with the front of vertex correspondingly convex, fossa of the male ovate, with the narrow end below, occupying nearly all of the width between the lower end of the eyes and most of the face. Pronotum highly polished, with the medial carina barely suggested, the surface convex and crossed by about fourteen brown slender lines, the anterior angle with a yellow bare spot, and behind it the brane; costal area dusky on the middle and at tip. Venter pale dull fulvous, sometimes dusky at tip.

Length to tip of wing-covers, ♂, 8; ♀, 8½–9 mm. Width of pronotum, 2½ mm.

Specimens were collected near Cape St. Lucas by Mr. John Xanthus. Numerous specimens in the collection of the California Academy are labeled "Cal. 2." The species is also known to me from specimens collected in Texas, Orizaba and elsewhere in Mexico, Arizona, New Mexico and southern Colorado.

CORISA LÆVIGATA Uhler. A specimen of this common insect was sent to me by Mr. Henry Edwards, as having been collected in Lower California. It has been collected at various places in southern California, as for example, San Bernardino, San Diego and Los Angeles; farther north it occurs near San Francisco.

CORISA sp.? One, or perhaps two other, species have been taken in the vicinity of Cape St. Lucas, but they were too much damaged to admit of identification.

DESCRIPTIONS OF THREE NEW LIZARDS FROM CALIFORNIA AND LOWER CALIFORNIA, WITH A NOTE ON PHRYNOSOMA BLAINVILLII.

BY JOHN VAN DENBURGH.

PHRYNOSOMA FRONTALIS sp. nov.

The long-spined horned toad of California has been sometimes called *Phrynosoma coronatum* Blain., sometimes *P. blainvillii* Gray. Dr. Stejneger has recently* called attention to the fact that the latter name only can be available, the form found at Cape St. Lucas (the type locality of *P. coronatum*) being distinct from that of Upper California. An examination of a very large series of horned toads in the museums of the Leland Stanford Junior University and the California Academy of Sciences, not only confirms Dr. Stejneger's position, but shows that there are in Upper California two distinct species, which seem never to have been separated. These are: a southern form, occupying San Diego County and extending into Lower California at least as far as San Tomas, characterized by the convex and almost smooth scales on the

California. I have therefore selected one of the northern specimens for my type of *P. frontalis*.

Description: Adult male (Type No. 93, Leland Stanford Junior University Museum, collected by C. H. Gilbert and W. W. Price in Bear Valley, San Benito County, California, March 31, 1893). Nostril pierced in the line of the canthus rostralis. Head spines, one occipital, three large posterior and two smaller anterior temporals, and one postorbital, on each side; and one small interoccipital. The enlarged plates below the infra-labials are large and pointed, five on each side, the series sometimes continued backward by small spines. Below the rictus is a large spine, with a smaller and more pointed one behind it. There are three or four series of enlarged, pointed, gular scales on each side, the exterior of which are continued back upon the gular folds. A few of the scales in front of the occipital spines are convex or pointed, and those on the temporal regions have ridges running in the general direction of the temporal spines. The other head scales are flat, each with numerous granulations, which are usually darker than the ground color of the head. There are two groups of spines on each side of the neck. Two rows of periphero-abdominal spines are present, the lower series shorter than the upper and composed of smaller spines. The tail is bordered with a single row of lateral spines, and has a small group of very long spines just behind the leg. The scales on the anterior surfaces of the limbs are large, pointed and strongly keeled; those on the chest, abdomen and proximal half of the ventral surface of the tail are smooth, but those on the terminal portion of the tail are keeled. Tympanum naked. Femoral pores sixteen.

Color above yellowish-white with large brown blotches, largest on nape. Chest and belly bright gamboge-yellow, mottled with gray and dusky. Gular regions paler yellowish-white, mixed with dark gray; the larger scales with bright yellow tips.

Length, 142 mm.; head, 21 mm.; hind leg, 60 mm.; fore leg, 45 mm.; tail, 52 mm.

Habitat: Santa Clara, Santa Cruz, Monterey and San Benito counties, and near Lemoore, Kings County, California.

There is great individual variation in the color of the specimens before me. This is perhaps explained, at least in part, by the fact that a live specimen changed its colors considerably in the course of a very few minutes. This was particularly well marked upon the chest and belly, which changed, in about three minutes, from a bright yellow with numerous slate colored spots, to a yellow of a slightly lighter hue from which the black spots had entirely disappeared.

UTA MICROSCUTATA sp. nov.

Two specimens of Uta from Lower California, while manifestly related to *U. nigricauda*, as shown by the presence of a single frontal, the general style of the dorat a distance varying from four to seven rows of scales from the median line. Thirty-four of the largest dorsal scales equal the length of the shielded part of the head. A slight dermal fold extends from above the thigh to near the upper end of the oval ear-opening. There is a strong gular fold, edged with rounded scales which are slightly larger than those just in front. The dorsal and posterior surfaces of the thighs, and the posterior surfaces of the arms, are finely granular. The other portions of the limbs are covered with scales, which are smooth on the ventral surfaces of the thighs, legs, arms and forearms, but keeled elsewhere. Scales on ventral parts of body smooth. Scales on back of tail much larger than those below, both strongly keeled. Femoral pores, fourteen on the left side, thirteen on the right. Enlarged post-anal plates present.

Color sooty black, slightly paler below. Back with a few irregularly-scattered light spots, and with nine pairs of faintly-marked vertebral bars of a deeper black. Chest and belly indigo; chin and throat azure; pre- and post-anal regions tinged with azure.

Length of head and body, 45 mm.; of tail, 84 mm.; of hind leg, 31 mm.; of fore leg, 21 mm.; of hind foot, 13 mm.; of shielded part of head, 10 mm.; of head to posterior border of ear, 11 mm. Depth of head, 6 mm.; its greatest width, 8 mm.

Adult female (No. 1222, Leland Stanford Junior University Museum, collected by J. M. Stowell in the San Pedro Martir Mts., Lower California, June 20 or 21, 1893). Differs from male in having thirty-two instead of thirty-four dorsal scales equal to the shielded part of head, and in having fifteen femoral pores. The general color is slaty gray, almost white below. Back with dark markings as in male. A gular patch of lemon yellow.

CNEMIDOPHORUS STEJNEGERI sp. nov.

Cnemidophori from northern Lower California and from San Diego County, California, present much the general appearance of *C. tigris undulatus* (Hallowell). They differ from that form in having the dorsal scales smaller, the gular scales and the scales on the collar larger, and in the presence of large and well-defined black spots on the gular region. From *C. tigris* B. & G. they differ by character of the scales as above indicated, by the absence of the slate-colored suffusion on the gular regions, and by the well-defined black markings on the sides of the head.

As shown by Dr. Stejneger,* *C. tigris* is the desert form found in eastern California as far south as the Mojave Desert, in southern Idaho, in Nevada, and in Utah. *C. tigris undulatus* inhabits the western slopes of the Sierras, and is also found on the western side of the interior valley of California, as is shown by specimens in the Museum of the Leland Stanford Junior University from Kelseyville, in Lake County, and from Los Gatos, Santa Clara County.

I take pleasure in dedicating this new form to Dr.

superior labials. Posterior gular scales rather large, abruptly separated from the very large and convex anterior gulars. Plates of collar very large, but smaller along its edge. Ventral plates in eight longitudinal rows. Back, neck and upper surfaces of limbs covered with very small, smooth, convex granules. Five rows of brachial plates; three rows of antebrachials; no post-antebrachial plates. Femoral plates in seven rows. Twenty and twenty-two femoral pores. Scales on tail large, oblique, slightly pointed, and with strong diagonal keels.

Color, above yellowish-brown posteriorly, becoming grayish towards head, paler on sides; with nine longitudinal rows of very irregular black spots. Upper surface of limbs similarly marked. Black markings on sides of head and neck and on gular region large and well defined. Lower surfaces creamy white, maculated with black.

Length, 343 mm.; head, 26 mm.; hind leg, 70 mm.; fore leg, 37 mm.; tail, 252.

Habitat: Northwestern Lower California, and San Diego County, California.

Twelve other specimens collected by Mr. Stowell at the type locality, at San Telmo, and in the foothills of the San Pedro Martir Mountains, Lower California, do not differ from the type in any important particular. The number of femoral pores varies from nineteen to twenty-five, of brachial plates from four to five rows and of antebrachials from two to three rows.

Forty-one specimens from San Diego County, California (collected in Santa Ysabel, Clogston's and Hemet Valleys; at San Jacinto and in the Julian Mountains, by Messrs. Hyatt and Stoddard), are essentially like those from Lower California, but average slightly paler in general coloration.

THE COLEOPTERA OF BAJA CALIFORNIA.

BY GEORGE H. HORN.

Our earliest knowledge of the Coleoptera of the Peninsula of California was obtained from a collection made by John Xantus de Vesey during 1859 and 1860, which, after its deposit in the Smithsonian Institution, was divided between Mr. H. Ulke and Dr. J. L. LeConte. The series was said to contain about 500 species, of which Dr. LeConte admits having seen 114. It is highly probable that Xantus greatly overestimated the species collected as the accompanying list is less than 700, many of which are new.

A few years later a small collection was made by the late W. M. Gabb, who, with some associates of the Geological Survey of California, visited parts of the peninsula. Unfortunately the localities from which this collection was obtained were not specified, although many are now ascertained through the collection under consideration.

No definite localities are known for the Xantus collecof the region, the most important series being that collected in 1893 in the region around San José del Cabo by Dr. Gustav Eisen.

The present study enabled me to confirm the views expressed by Messrs. Baird, Cope and LeConte, and, at the same time, to correlate details of distribution so that we come more nearly in accord with the botanical indications.

It seems to me unnecessary to repeat the geographical details of the peninsula, as they have been so clearly demonstrated by Mr. Brandegee in vol. ii of these Proceedings. In order that remarks to be made in this paper may be understood without reference to those of Mr. Brandegee, it may be stated that the peninsula is a narrow strip of land about 700 miles long, running in a south-southeasterly direction from the southern boundary of California, varying greatly in width, although in a general way narrowing from north to south. Through the axis runs a chain of mountains of a general elevation of 3,000 to 4,000 feet, The western slope is bordered by the Pacific Ocean, the eastern by the Gulf of California.

I have had occasion to note in speaking of the fauna of Guadalupe Island that the cold arctic current, which skirts the western shore of the North American continent, tends to render the insect fauna of the coast region very nearly uniform as far south as Point Conception, where the bluff coast and the rather abrupt eastern trend of the coast line deflect the current, or rather the coast recedes from the current, the climate becomes warmer and many interior species reach the coast. The western coast of the peninsula continues the general trend of the coast line from Santa Barbara, so that no portion of it seems to come within the influence of the Arctic current. On the eastern or gulf coast, the mountains and foothills approach the water and the entire region is comparatively barren with but few springs or water holes and is not unlike many parts of Arizona.

The most interesting and characteristic part of the peninsula is that called appropriately the Cape Region and which Mr. Brandegee defines as follows: "By the 'Cape Region' is meant that part of the peninsula south [east] of a line drawn along the northern [western] base of the mountains from Todos Santos to La Paz." The brackets in the above quotation are my own, as the maps show that the line from Todos Santos to La Paz is a north and south line.

As might be inferred, the coleopterous fauna of the San Diego region extends southward along the ocean side of the peninsula, with no striking admixture of species new or foreign to it. There are, however, long reaches of the coast region not yet visited.

From the northern end of the peninsula, nearly midway between the gulf and sea coasts and about 100 miles south of the political boundary line of California, an interesting series of 65 species has been sent me from the

American fauna and be considered as belonging to that of Central America.

Although politically a portion of the Republic of Mexico, the editors of Biologia Centrali-Americana have not considered the region as properly within their province by reason of the strong claims made for it as a part of the faunal region of our southwest.

The following pages consist of two distinct parts—a catalogue of all the species known to me as having been collected in Baja California, followed by descriptions of new species or comments on new occurrences.

The catalogue is a systematic one, following the order of the families of our most recent lists. Following each species is a list of localities, giving the general distribution as far as known to me, and in each case the special localities as given by the collectors. A certain number of species are from unknown localities; those of the Xantus series are quoted as from "Cabo San Lucas." In the case of a few in Mr. Ulke's cabinet, and not elsewhere represented, they are quoted "Baja California (Ulke)." The greater part of the latter are doubtless from the Cape Region, but species are among them collected south of San Diego.

The descriptive part contains descriptions of new species. The names appear in their proper places in the list, but the descriptions have been separated, so that the catalogue will not be broken up irregularly.

By the kind permission of the Publication Committee of the Academy, I have added descriptions of a number of new species either from adjacent regions or by reason of their relationship to those included by right in the paper.

I must at this time acknowledge the assistance rendered by Mr. H. Ulke of Washington, in completing the enumeration of the species collected by Xantus and not otherwise recorded.

Of the localities referred to the following are in the Cape Region of Baja California: San José del Cabo, Cabo San Lucas, La Paz, Pescadero, Todos Santos, Santa Anita, Miraflores, La Joya, La Chuparosa, Coral de Piedras, Sierra Laguna, Sierra El Chinche, Sierra El Taste, San Francisquito, Santo Domingo del Taste.

The following places are in Baja California north of the Cape Region: Magdalena Bay, Patrocinio, El Rosario, Comondu, Calmalli Mines, Calamajuet, San Estaban, Baja Purisima, San Julio, El Paraiso, San Quintin, San Luis, San Raymundo, San Borja, San Fernando, Santa Maria, San Ignacio, Guadalupe Island, San Jorge, San Pedro Martir, San José de Gracia, Santa Margarita Island, El Rancho Viejo.

CICINDELIDÆ.

TETRACHA CAROLINA Linn. Atlantic and Gulf coasts of United States and Mexico, west coast of Mexico; Baja California, from Fort Yuma to San José del Cabo.

CICINDELA HENTZII Dej. This with *16-punctata*, *rufiventris* and *cumatilis* apparently constitute one species with variation similar to the preceding. It occurs from Massachusetts in a general southwesterly direction to Utah, Texas and Arizona; in the peninsula at San José del Cabo.

CICINDELA PRÆTEXTATA Lec. New Mexico, Texas, Arziona; in peninsula at San José del Cabo.

CICINDELA LEMNISCATA Lec. Texas, Arizona; in the peninsula at San José del Cabo and La Paz.

CARABIDÆ.

CALOSOMA PROMINENS Lec. Western Arizona, southern Mojave region, northern Sonora. El Taste.

CALOSOMA PEREGRINATOR Guer. (*carbonatum* Lec.) New Mexico, Arizona, southern California, northern and middle Mexico. El Taste.

SCARITES SUBTERRANEUS Fab. var. CALIFORNICUS Lec. From Texas, whence Chaudoir has called it *texanus*, through Arizona, southern California. Comondu.

SCHIZOGENIUS PLURIPUNCTATUS Lec. Fort Yuma and vicinity. San Julio and Patrocinio. This species is remarkable in the large number of lateral thoracic setæ, two being the usual number.

SCHIZOGENIUS DEPRESSUS Lec. Riverside, Ariz.; Fort Yuma, Cal. San Esteban.

CLIVINA FERREA Lec. Illinois, Texas, Arizona. San José del Cabo, El Taste.

PANAGÆUS SALLEI Chd. Camp Grant, Ariz., southward to Jalapa, Mex. El Taste, Sierra El Chinche. These specimens have the black transverse band of elytra darker than the Arizona specimens.

PACHYTELES TESTACEUS Horn. Camp Grant, Ariz. El Chinche 2,000 feet.

PACHYTELES PARCA Lec. Arizona. Sierra El Chinche and San José del Cabo.

MORIO GEORGIÆ Beauv. Gulf States, Arizona, extending through Mexico to South America and Antilles. Pescadero and Sierra El Chinche 2,000 feet.

BEMBIDIUM MEXICANUM Dej. *nevadense* Ulke. Oregon, Nevada, California, Utah, Arizona, southward to Guatemala. La Paz, El Taste.

BEMBIDIUM LUGUBRE Lec. *stabile* Lec. This species is probably merely a concolorous form of *erosum* Motsch. (*Mannerheimii* Lec.). Colorado, Utah, Arizona, southern California. Patrocinio.

BEMBIDIUM FLAVOPICTUM Motsch. (*pictum*). Region west of Mississippi River from Alaska to Arizona. Comondu.

BEMBIDIUM NUBICULOSUM Chd. *laticolle* Lec. Arizona, Fort Yuma, Cal. Comondu and Baja Purisima.

Pterostichus Hornii Lec. Fort Yuma, Cal. San José del Cabo.

Pterostichus subcordatus Lec. New Mexico, Arizona, Fort Yuma, Cal. La Paz.

Pterostichus splendidulus Lec. Fort Yuma, Cal. Pescadero.

Amara jacobinæ Lec. Provo, Utah, Arizona, San Diego, Cal. San Pedro Martir.

Amara californica Dej. Oregon southward to Arizona. San Pedro Martir.

Calathus quadricollis Lec. Vancouver Island, through California to Arizona. San Pedro Martir.

Platynus brunneomarginatus Mann. Vancouver southward to Arizona. La Joya.

Platynus extensicollis Say. Widely distributed east of Rocky Mountains, Arizona, California. San José del Cabo.

Platynus californicus Dej. Oregon and Washington, southward through Nevada and Arizona. San José del Cabo.

Platynus cyanopis Bates. Arizona below Tubac, extending southward to Mexico City. San Julio.

Platynus funebris Lec. California, principally southern. El Paraiso.

Platynus maculicollis Lec. Widely distributed in California. San Pedro Martir.

Platynus fossiger Dej. Oregon southward. San Pedro Martir.

Anchonoderus apicalis n. sp. El Taste and Sierra Laguna.

CASNONIA PENNSYLVANICA Linn. Widely distributed over the entire United States. Coral de Piedra, La Paz and San José del Cabo.

TETRAGONODERUS FASCIATUS Hald. Atlantic States to Texas, Arizona and southern California. Cabo San Lucas. The specimens from the last three regions have the thorax slightly opaque and have been described under the name *undulatus* Lec.

CALLIDA RUGICOLLIS n. sp. Coral de Piedra, Sierra El Taste, Pescadero and San José del Cabo.

CALLIDA DECORA Fab. Florida to Texas. San José del Cabo.

LEBIA GRANDIS Hentz. Widely distributed over the Atlantic States, from Massachuetts southward to Texas and west to Colorado, Arizona. Sierra El Chinche.

LEBIA MAJUSCULA Chd. Western Texas, Arizona. San José del Cabo and El Taste.

LEBIA TESTACEA Lec. Texas. San José del Cabo.

LEBIA ANALIS Dej. Middle States to Texas. Coral

PENTAGONICA PICTICORNIS Bates. Differs from *pallipes* in its more oval elytra and by the pale elytral border being less sharply defined and becoming gradually broader toward the humeri. The under side of the body may be entirely piceous as in *pallipes* or the abdomen alone. In both species joints 2–3–4 of the antennæ are conspicuously pale, the first joint partly piceous. Camp Grant, Ariz. El Taste. Guatemala (Bates).

BRACHYNUS LATERALIS Dej. Missouri southward, Texas, Arizona, Fort Yuma, Cal. San José del Cabo.

BRACHYNUS FIDELIS Lec. Texas, Arizona. El Taste and La Chuparosa.

BRACHYNUS TSCHERNIKHII Mann. Widely distributed in California. San José del Cabo.

BRACHYNUS CARINULATUS Muls. Utah, California, Arizona. El Paraiso.

CHLÆNIUS CURSOR Chev. Southern California. Pescadero.

CHLÆNIUS CUMATILIS Lec. Yuma, Cal. San Esteban and San Julio.

CHLÆNIUS LEUCOSCELIS Chev. Utah, Arizona. El Taste.

CHLÆNIUS OBSOLETUS Lec. Southern California, Arizona. El Paraiso and San José del Cabo.

CHLÆNIUS VARIABILIPES Esch. Southern California. Baja California (Ulke).

CHLÆNIUS TRICOLOR Dej. Widely distributed in Atlantic region to Texas, Arizona. La Chuparosa.

SELENOPHORUS PEDICULARIUS Dej. Illinois to Texas, Colorado, Arizona. El Taste.

SELENOPHORUS PALLIATUS Fab. Florida to Texas and Arizona. San José del Cabo.

STENOLOPHUS OCHROPEZUS Say. Widely distributed in the Atlantic region, Arizona and southern California. San José del Cabo.

TACHYCELLUS NEBULOSUS Lec. Texas, Baja California (Ulke).

TACHYCELLUS NITIDUS Dej. British Columbia southward to Arizona. San José del Cabo and La Chuparosa. This species occurs also in Mexico from Orizaba southward, whence it is called *obsoletus* Say.

BRADYCELLUS RUPESTRIS Say. Variable in color and slightly in form. Known to me from every portion of Boreal America, except Alaska and the Hudson Bay region. La Chuparosa.

BRADYCELLUS RIVALIS Lec. Texas, Arizona, southern California. San Esteban.

BRADYCELLUS COGNATUS Gyll. Oregon, Washington, Utah, Colorado. San Pedro Martir.

HALIPLIDÆ.

CNEMIDOTUS SIMPLEX Lec. Southern California. San José del Cabo.

DYTISCIDÆ.

HYDROCANTHUS IRICOLOR Say. Illinois to Texas, Mexico. Santa Anita.

HYDROVATUS MAJOR Shp. Guatemala. Santa Anita. The identification is not certain. The description is so very brief as to make comparison necessary.

CANTHYDRUS LINEATUS Horn. Collected by Mr. Gabb in Baja California. Special locality unknown.

LACCOPHILUS DECIPIENS Lec. Vancouver southward. Baja California (Gabb).

LACCOPHILUS PICTUS Lap. Mexico from Puebla to Guatemala. Baja California (Gabb).

LACCOPHILUS TERMINALIS Shp. Texas, Fort Yuma, Guanajuato, Mexico. Baja California (Gabb).

DESMOPACHRIA DISPERSA Cr. Texas, Arizona. Baja California.

BIDESSUS CINCTELLUS Lec. Southern California, Riverside, Ariz. Baja California (Gabb).

BIDESSUS AFFINIS Say. Widely distributed. Vermont to Oregon, California, Arizona. Baja California (Gabb).

BIDESSUS AMANDUS Lec. Southern California and Arizona. San Esteban.

HYDROPORUS FUNEREUS Cr. Baja California.

HYDROPORUS ADDENDUS Cr. Arizona. Baja California.

HYDROPORUS VILIS Lec. Washington, Oregon, California, Arizona. La Joya.

Cœlambus medialis Lec. Texas, Arizona, southern California. San Ignacio, Comondu and La Joya.

Deronectes striatellus Lec. Colorado, Oregon, California. San Francisquito.

Copelatus Chevrolatii Aubé. Oklahoma, Texas. Baja California.

Ilybiosoma regularis Lec. Southern California. La Chuparosa.

Eretes sticticus Linn. Almost cosmopolitan in distribution. Texas, Coahuila, Mexico, southern California. Cabo San Lucas.

Rhantus atricolor Aubé. Texas, Arizona, Upper Mexico. El Taste and San Francisquito.

Rhantus flavogriseus Crotch. Idaho, California, Arizona. Comondu and Guadalupe Island.

Rhantus binotatus Harris. Widely distributed from H. B. T. southward. San Esteban.

Hydaticus stagnalis Fab. Very variable in coloration. Illinois westward to Vancouver, thence southward elongate or scratchy punctures, except at apex and along the lateral margin.

In its facies this species superficially resembles our *Dytiscus fasciventris*, but beneath is entirely dark chestnut brown. Occurs in the Antilles, San Domingo, Demerara, South America, Guatemala. Cabo San Lucas and San José del Cabo.

CYBISTER ELLIPTICUS Lec. Southern California, Yuma and vicinity. Cabo San Lucas (fide Ulke.)

GYRINIDÆ.

DINEUTES SUBLINEATUS Aubé. Texas, Arizona, Mexico from Coahuila to Nicaragua. Cabo San Lucas.

GYRINUS PLICIFER Lec. Middle California, southward to Arizona. La Chuparosa.

GYRINUS PARCUS Lec. Oklahoma, Texas, Mexico to Nicaragua. La Chuparosa.

HYDROPHILIDÆ.

HELOPHORUS OBSCURUS Lec. Oregon and California southward. San Pedro Martir.

EPIMETOPUS COSTATUS Lec. Texas. San José del Cabo.

OCHTHEBIUS INTERRUPTUS Lec. Vancouver, Colorado, Arizona. Comondu.

HYDROPHILUS INSULARIS Cast. Texas, southern California, Mexico, Guatemala, Yucatan, Antilles.

It is possible that *triangularis* Say and *ater* Fab. may occur in the peninsula.

TROPISTERNUS LIMBALIS Lec. Oregon, California, Utah, Arizona. Cabo San Lucas.

Tropisternus lateralis Fab. (*nimbatus* Say). Widely distributed in the Atlantic region to Texas, through the Antilles and Mexico to South America. San José del Cabo. The synonymy is on the authority of Dr. Sharp, who states that the species is very variable in the extent of the yellow border, as shown by specimens from the southern regions.

Tropisternus ellipticus Lec. Utah, Texas, California, Arizona. San José del Cabo.

Tropisternus californicus Lec. Oregon, Colorado, Utah, California. Cabo San Lucas.

Tropisternus nitens Cast. Mexico from Oaxaca south to Brazil. San Pedro Martir.

Tropisternus apicipalpis Chev. Mexico from Jalapa to Costa Rica. Cabo San Lucas.

Hydrocharis glaucus Lec. Southern California to Arizona. San Luis.

Berosus rugulosus Horn. Arizona. San José del Cabo.

CRENIPHILUS INFUSCATUS Mots. Lake Superior region westward to Oregon and south to San Diego. San Pedro Martir.

CRENIPHILUS SUTURALIS Lec. Maryland to Texas. San José del Cabo, San Esteban and Comondu.

PHÆNONOTUM EXTRIATUM Say. Illinois, Florida, Louisiana, Texas. Comondu.

SILPHIDÆ.

SILPHA RAMOSA Say. Oregon, California, Utah, Nebraska, New Mexico. San Pedro Martir.

STAPHYLINIDÆ.

MASEOCHARA VALIDA Lec. Southern California and Arizona. San José del Cabo.

ALÆOCHARA NITIDA Grav. Common in Europe and widely distributed in North America. Calmalli Mines.

ALÆOCHARA SULCICOLLIS Mann. California. Cabo San Lucas.

GYROPHÆNA sp. indet. Santo Domingo del Taste.

HOMALOTA sp. indet. San José del Cabo.

STAPHYLINUS SAPHYRINUS Lec. California, from north to Fort Yuma. San José del Cabo.

STAPHYLINUS LUCANUS n. sp. La Chuparosa.

XANTHOPYGUS CACTI Horn. Camp Grant, Ariz. La Chuparosa.

BELONUCHUS EPHIPPIATUS Say. Texas, Arizona. Cabo San Lucas.

BELONUCHUS XANTHOMELAS Solsky. Dr. Sharp (Biol. Cent. Am., vol. i, pt. 2, p. 417) places this species in Philonthus, from the absence of spines on the hind femora. My specimens vary in this respect: the spines may be present or not, or there may be one or two on one femur and none on the other. The difference between Belonuchus and Philonthus is at most very slight. Occurs in Arizona and northern Mexico. Cabo San Lucas and San Francisquito.

PHILONTHUS FLAVOLIMBATUS Erichs. Gulf States, Arizona. Cabo San Lucas.

PHILONTHUS POLITUS Linn. (*æneus* Rossi). Abundant in Europe and Boreal America. San José del Cabo.

PHILONTHUS INSTABILIS Horn. Wyoming, Colorado, Utah, Mojave, Cal. La Chuparosa.

PHILONTHUS ALUMNUS Erichs. In its different varieties distributed on the Atlantic and Gulf regions, Antilles, Mexico, Texas, Arizona. San José del Cabo.

PHILONTHUS QUADRULUS Horn. Arizona. Cabo San Lucas.

ACTOBIUS PÆDEROIDES Lec. Utah, Texas, California, Arizona. San José del Cabo.

LATHROBIUM LITUARIUM Lec. Arizona. San José del Cabo.

LITHOCHARIS sp. indet. San José del Cabo.

STILICUS TRISTIS Mels. Middle States to Arizona. Pescadero.

PÆDERUS FEMORALIS Lec. Southern California, Arizona. Cabo San Lucas.

PÆDERUS GRANDIS Aust. Cabo San Lucas. Mr. Austin is in error in his localities.

PLATYSTETHUS AMERICANUS Erichs. Widely distributed in the Atlantic region, Texas, Arizona, southern California. San José del Cabo.

BLEDIUS sp. indet. Belongs to the *annularis* group. San José del Cabo.

SCAPHIDIIDÆ.

SCAPHISOMA APICALE n. sp. La Chuparosa.

SCAPHISOMA PENINSULARE n. sp. Sierra Laguna.

PHALACRIDÆ.

PHALACRUS OVALIS Lec. Nevada, California to Fort Yuma. San Jorge.

STILBUS OBTUSUS? Lec. Los Angeles, southward. Comondu.

CORYLOPHIDÆ.

SACIUM AMABILE Lec. Arizona. Coral de Piedra, Sierra El Taste.

COCCINELLIDÆ.

MEGILLA MACULATA DeGeer. Widely distributed in Boreal America. San José del Cabo.

HIPPODAMIA CONVERGENS Guér. Widely distributed in the west, Canada, Colorado, New Mexico, Utah, California. El Paraiso.

Cycloneda sanguinea Linn. Europe and North America. Comondu.

Cycloneda abdominalis Say. Kansas, Nebraska, Texas, California. Calmalli Mines and El Paraiso.

Cycloneda oculata Fab. Kansas, Texas, Oregon, California. El Paraiso.

Thalassa montezumæ Muls. Mexico. San José del Cabo. Thalassa is not considered distinct from Menoscelis by recent authors.

Hyperaspis undulata Say. Eastern United States, Montana to Texas, California. El Taste.

Psyllobora tædata Lec. Oregon, southward through California and Arizona. The *P. vigintimaculata*, of which *tædata* is probably merely a variety, is widely distributed in the Eastern States. La Chuparosa and Baja Purisima.

Epilachna corrupta Muls. Colorado, New Mexico, Texas, Arizona, extending into Mexico. San José del Cabo.

CUCUJIDÆ.

SILVANUS SURINAMENSIS Linn. Distributed by commerce almost everywhere.

CATHARTUS ADVENA Walbl. Also widely spread.

SCALIDIA LINEARIS Lec. Texas, Arizona. San José del Cabo.

LÆMOPHLÆUS CEPHALOTES Lec. Southern California. San José del Cabo.

MYCETOPHAGIDÆ.

TYPHŒA FUMATA Linn. Widely spread by commerce. San José del Cabo.

LITARGUS BALTEATUS Lec. Colorado, Texas, Arizona, southern California. Comondu, San Luis and San José del Cabo.

BERGINUS PUMILUS Lec. Fort Yuma, Cal. Margarita Island.

DERMESTIDÆ.

DERMESTES VULPINUS Fab. Cosmopolitan.

DERMESTES FRISCHII Kug. Europe; coast of New Jersey. San José del Cabo and Comondu.

DEMESTES MANNERHEIMII Lec. California. San Ignacio.

ATTAGENUS HORNII Jayne. Utah, Texas, Arizona, California. Comondu.

TROGODERMA STERNALE Jayne. New Mexico, Texas, Arizona, California. Calmalli Mines.

TROGODERMA ORNATUM Say. Canada to California. Calmalli Mines.

CRYPTORHOPALUM HÆMORRHOIDALE Lec. Colorado, Texas, Arizona. El Paraiso and Comondu.

ANTHRENUS SCROPHULARIÆ Linn. var. LEPIDUS Lec. Widely distributed in Europe and North America, and very variable. San Julio.

HISTERIDÆ.

HOLOLEPTA YUCATECA Mars. Yucatan and northward in Mexico, Texas, Arizona, southern California. Sierra El Chinche (2,000 feet). The male has recently been redescribed as *pervalida* by Blaisdell (Zoe, iii, p. 337).

HISTER LUCANUS Horn. Southern California. San José del Cabo.

PAROMALUS CONSORS Lec. Southern California to Mexico. Sierra El Chinche (2,000 feet).

SAPRINUS BEHRENSII Horn. San Diego, Cal. San Pedro Martir.

SAPRINUS PLACIDUS Erichs. Georgia, Missouri, Arizona. San José del Cabo.

SAPRINUS FIMBRIATUS Lec. Utah, California, Arizona. San José del Cabo.

NITIDULIDÆ.

CERCUS SERICANS Lec. California, Nevada. Cabo San Lucas.

CONOTELUS MEXICANUS Murr. Southern California and Arizona, also in Mexico. La Joya.

CARPOPHILUS PALLIPENNIS Say. Kansas, Colorado, Nebraska, Texas, Utah, Arizona, California. San Raymundo, San José del Cabo and El Taste. The dark variety *floralis* Er. also occurs.

STELIDOTA GEMINATA Say. Middle and southern States. San José del Cabo.

STELIDOTA STRIGOSA Sch. Pennsylvania southward. Sierra Laguna.

PROMETOPIA SIXMACULATA Say. The only specimen is of an entirely pale yellow color, but not exhibiting any structural differences from the specimens collected in the Atlantic States. Notwithstanding its pale color, faint traces of the usual markings of the species may be seen by careful examination. Atlantic and Gulf regions, Oklahoma. San José del Cabo.

LOBIOPA UNDULATA Say. Massachusetts to Arizona. Sierra Laguna. The specimens from Arizona and Baja California are much larger than those from the Atlantic States.

LATHRIDIIDÆ.

CORTICARIA MOROSA Lec. Fort Yuma, Cal. Margarita Island.

TROGOSITIDÆ.

TROGOSITA VIRESCENS Fab. var. CHLORODIA Mann. Oregon, California and Arizona. San José del Cabo.

TROGOSITA BARBATA Lec. Sierra El Chinche, Cabo San Lucas.

TENEBRIOIDES MAURITANICA Linn. Cosmopolitan. Diffused by commerce.

ALINDRIA TERES Mels. Atlantic region, Arizona, California. Sierra El Chinche (2,000 feet).

BYRRHIDÆ.

LIMNICHUS NEBULOSUS Lec. Los Angeles and southward, California. Comondu.

PARNIDÆ.

PSEPHENUS HALDEMANNI Horn. Baja California.

DRYOPS PRODUCTUS Lec. California, Arizona. El Paraiso, Comondu, Santa Maria, San Ignacio.

ELMIS ABNORMIS Horn. Arizona. Baja California.

ELMIS SIMILIS Horn. New Mexico and Arizona. Comondu.

DASCYLLIDÆ.

ANORUS PICEUS Lec. Owens Valley and southern California. San-Pedro Martir.

cylindrical, the former contiguous and with distinct trochantin. The last joint of the tarsus with a setose onychium, not at all prominent however in the present genus. The tarsi are not lobed beneath, the third joint acutely notched, the fourth small and not visible beyond the emargination of the third. The first and fifth joints are equal, the second and third nearly so, but shorter than the other two.

The head is transversely oval, slightly prolonged behind the eyes and abruptly forming a neck. The eyes large, rounded, slightly truncate in front, rather coarsely granulated. Antennal tubercles spiniform. Antennæ twelve-jointed and flabellate (in the males) joints 3 to 11 with a slender branch which is slightly longer than the length of the preceding part of the antennæ, that is to say the branch from the third joint is longer than joints 1 to 3 of the antennæ and so continuously. The terminal joint and the branch from the preceding are equal in length. The mandibles are falciform, prominent and strongly bidentate at middle. The maxillary palpi are long, slender and four-jointed, the second joint longest, third joint two-thirds as long, fourth a little shorter than second and slightly fusiform. Labial palpi slender and long, the last two joints about equal in length. The mouth-parts otherwise are feebly developed. Thorax conical with slightly arcuate sides, the lateral border not very distinct. Elytia broader at base than the thorax, sides convergent to apices, these separately rounded, substance coriaceous.

The comments above apply to the male; the other sex is unknown to me, but Mr. Bates describes the antennæ as half the length of the body, filiform and simple. While I greatly regret to differ so radically from my lamented friend H. W. Bates in the systematic position of this insect, the aggregate of its organization points to the family in which it is here placed. The fact that the tarsi are five-jointed removes it from association with any but the most aberrant Cerambycidæ in the earlier groups of Prionides, with which no one would pretend to associate this insect. That the fourth tarsal joint is small might seem an objection to its association with the Rhipiceridæ, but this is by no means insuperable, as in an adjacent family, Dascyllidæ, we have an entire group, the Ptilodactylini, so constituted. In view of the fact that the family Rhipiceridæ contains but few genera not requiring tribal subdivision for their elucidation, I would suggest that Vesperoctenus be placed near Callirhipis, from which it differs in its twelve-jointed antennæ and the small fourth tarsal joint.

Occurs at San Francisquito in the Cape Region and in Mexico.

ELATERIDÆ.

MERISTHUS CRISTATUS Horn. Texas. Cabo San Lucas.

CHALCOLEPIDIUS RUBRIPENNIS Lec. San José del

Cryptohypnus ornatus Lec. California, Utah. San Pedro Martir.

Cryptohypnus pectoralis Say. Texas, Arizona, California. San Luis and San Esteban.

Monocrepidius sordidus Lec. Utah, California, Arizona. La Chuparosa.

Dicrepidius corvinus Cand. Southern California, Arizona. El Taste and vicinity, San José del Cabo.

Anchastus bicolor Lec. (var. *desertus* Horn.) Fort Yuma, Cal., Arizona. Cabo San Lucas.

Ischiodontus ferreus Lec. Texas, Arizona. El Taste.

Ischiodontus soleatus Say. Middle Atlantic region to Texas. San José del Cabo.

Ludius texanus Lec. Texas, Arizona. San José del Cabo.

Melanotus cribricollis Cand. Southern California, Arizona. Comondu.

Dolopius lateralis Esch. Widely distributed in the Pacific region, Arizona. San Pedro Martir.

Eniconyx pullatus Horn. Arizona. San José del Cabo.

Plastocerus Schaumii Lec. Southern California. Calmalli Mines and El Paraiso.

BUPRESTIDÆ.

Gyascutus obliteratus Lec. Owens Valley southward in California, Arizona. El Chinche and Cabo San Lucas.

Anthaxia æneogaster Lap. (var. *strigata* Lec.). Widely distributed in Pacific region. Cabo San Lucas.

Chrysobothris Edwardsii Horn. Tucson, Ariz. San José del Cabo.

Chrysobothris acutipennis Chev. Texas, Arizona. San José del Cabo.

Chrysobothris purpureovittata Horn. Texas, Arizona. San José del Cabo.

Chrysobothris lixa Horn. Texas, Arizona. Calamajuet.

Chrysobothris lucana n. sp. Sierra El Chinche and San José del Cabo.

Chrysobothris bicolor n. sp. San José del Cabo.

Polycesta velasco Lap. et Gory. Texas, Arizona. El Chinche (2,000 feet).

Acmæodera flavomarginata Gray. Texas, Mexico, Arizona. San José del Cabo.

Acmæodera flavosticta Horn. Southern California. Magdalena Island, Comondu and Cabo San Lucas.

Acmæodera subbalteata Lec. Cabo San Lucas.

Agrilus lacustris Lec. (var. *cuneus* Lec.). Lake Superior region southwestward to Texas and Arizona. San José del Cabo.

Agrilus addendus Crotch. Texas, Arizona. Coral de Piedra, Sierra El Taste.

LAMPYRIDÆ.

Lycus cruentus Lec. Texas, Arizona. San Francisquito and La Paz.

Plateros sanguinicollis n. sp. San José del Cabo and Sierra El Chinche.

Pyropyga fenestralis Mels. Entire Atlantic region, Colorado, Utah, Arizona, California. Comondu.

Microphotus dilatatus Lec. Arizona, northwestern Mexico. Coral de Piedro. Sierra El Taste.

Cenophengus debilis Lec. Los Angeles, Cal. Arizona. San José del Cabo. Coral de Piedra, Sierra El Taste.

Telephorus decipiens n. sp. San Pedro Martir Mountains.

MALACHIIDÆ.

Collops validus Horn. Sonora. Mexico. Baja Purisima.

Collops vittatus Lec. Colorado. New Mexico. Texas. Arizona. El Paraiso.

Collops marginicollis Lec. Utah. Arizona. southern California. San Pedro Martir.

Attalus [illegible] Lec. Nevada. Colorado. Calmalli Mines.

Attalus [illegible] Lec. [illegible] New Mexico. Texas. El Paraiso.

[illegible]

Attalus difficilis Lec. California, Arizona, San Borja.

Attalus setosus n. sp. San José del Cabo.

Attalus unicolor n. sp. La Chuparosa.

Pristoscelis sordidus Lec. Southern California. San Esteban and Magdalena Island.

Pristoscelis tejonicus Lec. Fort Tejon southward. San Julio.

Pristoscelis antennatus Motsch. Colorado, Arizona. El Paraiso.

Pristoscelis convergens Lec. Utah, Arizona, Margarita Island.

Pristoscelis brevicornis Lec. Southern California. Calamajuet.

Pristoscelis fulvotarsis Bld. Oregon, Yuma, Cal. Calmalli Mines.

In addition to the above are nearly as many more species represented by material insufficient for study.

CYMATODERA OBLITA Horn. Nevada, Arizona. Cabo San Lucas.

CYMATODERA PUNCTICOLLIS Bland. California, Arizona. Baja California (Ulke.)

CYMATODERA XANTI Horn. Cabo San Lucas (Lec.)

CYMATODERA FASCIFERA Lec. Cabo San Lucas (Lec.)

CYMATODERA PURPURICOLLIS n. sp. Sierra El Chinche.

AULICUS NERO Spin. New Mexico, Southern California. El Chinche. This species was described by Spinola as from Mexico, but has not been recognized by the author of the Biologia. The coloration is variable, but specimens in my cabinet reproduce Spinola's figure accurately.

TROGODENDRON EDWARDSII Horn. Tucson, Ariz. El Chinche 2,000 feet. While this insect possesses all the structural characters of the genus as far as given in the books the species is very unlike the typical form in coloration.

TRICHODES PENINSULARIS n. sp. El Chinche.

CLERUS QUADRISIGNATUS Say. Arizona, San José del Cabo.

HYDNOCERA OMOGERA n. sp. San José del Cabo.

ORTHOPLEURA DAMICORNIS Fab. Texas. San José del Cabo.

LEBASIELLA JANTHINA Lec. Cabo San Lucas.

CORYNETES RUFIPES Fab. Cosmopolitan.

PTINIDÆ.

PTINUS INTERRUPTUS Lec. California. San José del Cabo.

PTINUS PYGMÆUS Gorham. California, Guatemala. Baja California (Ulke).

SITODREPA PANICEA Linn. Cosmopolitan. Cabo San Lucas.

TRICHODESMA SELLATA n. sp. El Taste.

HADROBREGMUS PUMILIO? Lec. Canada to Texas. San José del Cabo.

EUPACTUS PUDICUS Boh. Cabo San Lucas (LeConte).

XYLETINUS PALLIDUS Lec. Cabo San Lucas (LeConte).

LASIODERMA DERMESTINUM Lec. Cabo San Lucas (LeConte).

HEMIPTYCHUS OBSOLETUS Lec. San José del Cabo.

HEMIPTYCHUS ESTRIATUS n. sp. San Fernando.

AMPHICERUS PUNCTIPENNIS Lec. Utah, Texas, Arizona, California, extending through Mexico to Panama, Hawaiian Islands. San José del Cabo.

AMPHICERUS FORTIS Lec. Utah, Arizona, California.

asserts that our other species of Sinoxylon must be referred to some other genus.

Dinoderus truncatus Horn. California. Cabo San Lucas.

Polycaon punctatus Lec.

Polycaon exesus Lec. Collected by Xantus probably near Cabo San Lucas.

Lyctus planicollis Lec. Colorado, Texas, California. Baja California.

Lyctus californicus Casey. Fort Yuma, Cal. San San José del Cabo.

CIOIDÆ.

Ceracis similis n. sp. Coral de Piedra.

Rhipidandrus peninsularis n. sp. Coral de Piedra, Sierra El Taste.

SPHINDIDÆ.

Eurysphindus hirtus Lec. Detroit and vicinity. El Taste. A remarkable distribution, but the specimens are absolutely identical.

PASSALIDÆ.

Passalus sp. One species is known to me from the Cape Region. I have not yet been able to place it in any of the genera into which Passalus has been divided, and await the occurrence of more material that specimens may be sent abroad for comparison.

SCARABÆIDÆ.

Canthon puncticollis Lec. Arizona. San José del Cabo.

Canthon simplex Lec. California, Arizona. San Pedro Martir.

CANTHON OBLIQUUS n. sp. Pescadero, Sierra El Chinche.

APHODIUS GRANARIUS Linn. A species of European origin becoming cosmopolitan through commerce. San Pedro Martir.

ATÆNIUS LUCANUS Horn. San José del Cabo.

ATÆNIUS STRIGATUS Say. United States east of Rocky Mountains. San José del Cabo.

ATÆNIUS DESERTUS Horn. Utah, Arizona, southern California. San José del Cabo.

ATÆNIUS GRACILIS Mels. Eastern United States. Comondu.

ATÆNIUS LOBATUS Horn. El Taste, Cabo San Lucas.

ATÆNIUS TEXANUS Harold. Texas, Arizona. San José del Cabo.

PSAMMODIUS NANUS DeGeer. Cuba, Central America, Massachusetts, Michigan, Texas, Arizona, California. San José del Cabo.

GLARESIS MENDICA Horn. Arizona. Baja California (Ulke.)

CHNAUNANTHUS DISCOLOR Burm. Occurs throughout Mexico. San Luis, Comondu, Calmalli Mines, San Jorge.

This species varies in color. It may be entirely black, or with the head and thorax dark and elytra testaceous, the latter often darker along the suture and sides.

It seems to have escaped observation that the sexes are very readily separable. The males have no anterior tibial spur and the pygidium as long as wide and regularly convex. The female has an anterior tibial spur, the pygidium broader than long and slightly concave near the apex.

ONCERUS CONVERGENS n. sp. Calmalli Mines.

DICHELONYCHA PICEA n. sp. San José del Cabo and El Chinche 2,000 feet.

DICHELONYCHA PUSILLA Lec. Southern California. San Pedro Martir.

SERICA MIXTA Lec. California, Nevada. San Pedro Martir.

SERICA PILIFERA n. sp. Santa Maria.

DIPLOTAXIS PUNCTULATA n. sp. San José del Cabo and Coral de Piedra.

DIPLOTAXIS MŒRENS Lec. Southern California. Calmalli Mines, Santa Maria.

DIPLOTAXIS TRISTIS Kby. Lake Superior, Middle States to Colorado and Texas. San José del Cabo.

DIPLOTAXIS ANGULARIS Lec. Arizona. Cabo San Lucas, San José del Cabo.

Diplotaxis tenuis Lec. Southern California. Cabo San Lucas, Baja California (Ulke.)

Lachnosterna maculicollis Lec. San José del Cabo.

Lachnosterna nitidula Lec. San José del Cabo.

Listrochelus puberulus Lec. Coral de Piedra, Sierra El Chinche, Cabo San Lucas.

Listrochelus densicollis Lec. With the preceding.

Listrochelus mucoreus Lec. Texas, Arizona, southern California. Cabo San Lucas.

Listrochelus obtusus Lec. Texas, Arizona. San José del Cabo.

Listrochelus carminator n. sp. San José del Cabo.

Anomala centralis Lec. Arizona, Sonora. San José del Cabo.

Pelidnota Lucæ Lec. San José del Cabo.

Cotalpa ursina Horn. Southern California. San Pedro Martir.

MEGASOMA THERSITES Lec. Cabo San Lucas, San José del Cabo.

PHILEURUS ILLATUS Lec. Arizona. San Francisquito.

EUPHORIA FASCIFERA Lec. San José del Cabo.

CREMASTOCHILUS WHEELERI Lec. Nebraska, El Dorado County, Cal.

CREMASTOCHILUS PILOSICOLLIS Horn. California, Nevada.

CREMASTOCHILUS CRINITUS Lec. California.

The three species above were collected below San Diego within the peninsula.

CREMASTOCHILUS OPACULUS n. sp. Pescadero.

CERAMBYCIDÆ.

MALLODON MOLARIUM Bates. Mexico, Panama, Nicaragua. San José del Cabo.

MALLODON MANDIBULARE Gemm. *gnatho*‖ Lec. Texas, Arizona, Sonora, southern California. San José del Cabo. This species has been incorrectly referred to Nothopleurus by Bates.

DEROBRACHUS GEMINATUS Lec. Texas, Arizona, Mexico. San José del Cabo.

ACHRYSON SURINAMUM Linn. Widely distributed from middle Atlantic States to Paraguay. San José del Cabo.

OSMIDUS GUTTATUS Lec. Arizona. San José del Cabo.

GNAPHALODES TRACHYDEROIDES Thoms. Texas. Mexico. San José del Cabo.

HAMMATICHERUS MEXICANUS Thoms. Mexico. Cabo San Lucas (LeConte).

EBURIA ULKEI Bland. Cabo San Lucas.

Eburia conspersa n. sp. San José del Cabo.

Elaphidion punctatum Lec. Arizona. Cabo San Lucas.

Aneflus prolixus Lec. Cabo San Lucas.

Aneflus protensus Lec. Arizona. El Chinche.

Aneflus volitans Lec. San José del Cabo.

Eustroma validum Lec. Arizona, southern California. San José del Cabo.

Compsa puncticollis Lec. San José del Cabo.

Compsa quadriplagiata Lec. Cabo San Lucas, El Taste. It is more than probable that this species is one of the numerous varieties of *Ibidion textile* Thoms.

Phyton discoideum Lec. Cabo San Lucas.

Rhopalophora rugicollis Lec. Texas. San José del Cabo.

Acyphoderes delicatus n. sp. El Taste.

Callichroma cobaltinum Lec. Cabo San Lucas.

Dendrobias mandibularis Serv. Texas, Arizona, Cyllene antennatus White. Arizona. Cabo San Lucas, Baja California (Ulke).

Rhopalopachys irroratus Lec. Texas, Arizona, Mexico. El Taste.

Euderces parallelus Lec. San José del Cabo.

Atimia dorsalis Lec. Southern California. Baja California, south of San Diego.

Acmæops falsa Lec. Southern California. Calmalli Mines.

Ophistomis ventralis n. sp. Southern California. El Taste.

Leptura sexspilota Lec. California. San Pedro Martir.

Monilema semipunctatum Lec. Near Cabo San Lucas.

Monilema spoliatum Horn. San Borga.

Monilema subrugosum Bland. San José del Cabo. It is very likely that *longipes* White, described as from China, is the same species.

Ptychodes trilineatus Linn., *vittatus* Fab. Gulf States, Mexico, West Indies, South America. San José del Cabo.

Acanthoderes peninsularis Horn. San José del Cabo.

Liopus crassulus Lec. Cabo San Lucas.

Lagochirus obsoletus Thoms. Mexico. Cabo San Lucas.

Cœnopœus niger n. sp. El Chinche 2,000 feet.

Mecotetartus antennatus Bates. Mexico. Cabo San Lucas, Sierra El Chinche.

LOPHOPŒUM VOLITANS Lec. Cabo San Lucas.

ESTOLA SORDIDA Lec. San José del Cabo.

TAPEINA NUDICORNIS Bates. This species has been placed doubtfully in Tapeina by Mr. Bates. He seems not to have recognized the sexes in his material, but I can now assert that the males do not have the head broadened as in *transversifrons*. The females in both species have a slight fovea in the last ventral segment, while the male segment is plain. This with an Arizona species will constitute a new genus in the second part of this essay.

Occurs in Mexico, Oaxaca. Sierra El Chinche 2,000 feet.

TETRAOPES ELEGANS n. sp. San José del Cabo.

CHRYSOMELIDÆ.

LEMA PENINSULÆ Crotch. Cabo San Lucas.

LEMA FLAVIDA n. sp. San José del Cabo.

LEMA OMOGERA n. sp. El Taste.

LEMA TEXANA Cr. Illinois, Texas. Coral de Piedra, EURYSCOPA LECONTEI Crotch (*parvula* Jacoby). Arizona, southern California. El Taste.

EXEMA CONSPERSA Mann. Colorado, Utah, Texas, Arizona, California. San José del Cabo.

MEGALOSTOMIS MAJOR Cr. Texas, Arizona. Sierra El Chinche. This is represented by one specimen with the red basal region less extended than in typical specimens. It may represent a distinct species, but this cannot be asserted until more specimens show the extent of variation.

BASSAREUS CONGESTUS Fab. Florida, Georgia, Texas. San José del Cabo.

PACHYBRACHYS DONNERI Crotch. Utah, California. Coral de Piedra, El Taste.

PACHYBRACHYS XANTI Crotch. San José del Cabo.

PACHYBRACHYS TURBIDUS Lec. Texas. Coral de Piedra, Sierra El Chinche, El Taste, San José del Cabo.

PACHYBRACHYS ATOMARIUS Mels. Illinois, Missouri, Texas, Arizona. San José del Cabo.

DIACHUS AURATUS Mann. Oregon, California, Arizona. Baja Purisima.

MONACHUS GUERINII Perbosc. Sonora, Mex. Baja Purisima.

MYOCHROUS LONGULUS Lec. Arizona, southern California. Baja California (Ulke).

CHRYSOCHUS COBALTINUS Lec. California. Baja California (Ulke.)

METACHROMA PENINSULARE Crotch. Cabo San Lucas.

MYOCORYNA PENINSULARIS n. sp. Coral de Piedra, Sierra El Taste.

Trirhabda flavolimbata Mann. California, Utah.

Trirhabda luteocincta Lec. California.

Trirhabda nitidicollis Lec. Colorado, New Mexico, Utah. The above were found at San Pedro Martir.

Trirhabda caduca Horn. Owens Valley, Cal. San Luis.

Monoxia consputa Lec. Entire region west of Mississippi River. Baja California (Ulke).

Diabrotica soror Lec. California. San Pedro Martir.

Diabrotica balteata Lec. Texas, Arizona, Sonora. Sierra El Chinche 2,000 feet, and San José del Cabo.

Diabrotica variegata Jacoby. Mexico. San José del Cabo. There may be some doubt as to the correctness of this determination, but I prefer the doubt rather than a possible synonym, as there are quite a number of species similarly marked, so that comparison will be necessary to correctly determine the names. The species is related to *picticornis*, but may be separated from that by the general color, greenish-yellow, and the posterior band

HOMOPHOETA LUSTRANS Cr. Texas. El Chinche 2,000 feet.

DISONYCHA QUINQUEVITTATA Say. Widely scattered in distribution. San José del Cabo.

HALTICA IGNITA Illig. Widely distributed. San José del Cabo. The variety seen is that of deep blue color.

HALTICA PUNCTIPENNIS Lec. Kansas, Colorado, Texas, California. Baja California (Fuchs).

HALTICA FOLIACEA Lec. Texas, Arizona. La Chuparosa.

HALTICA TINCTA Lec. Oregon, California, Nevada. San Francisquito.

EPITRIX CUCUMERIS Harris. Atlantic region to Arizona, California. El Taste.

EPITRIX FLAVOTESTACEA n. sp. El Taste.

EUPLECTROSCELIS XANTI Crotch. San José del Cabo.

SYSTENA TÆNIATA Say. var. OCHRACEA Lec. Yuma, Cal. Baja Purisima (Fuchs).

DYSPHENGES n. g. ELONGATULUS n. sp. El Taste.

LONGITARSUS REPANDUS Lec. San Diego and Yuma, Cal. Baja California (Ulke).

LONGITARSUS LIVENS Lec. California, Arizona. San Quintin (Fuchs).

LONGITARSUS BICOLOR n. sp. Margarita Island.

PHYLLOTRETA PUSILLA Horn. Colorado, Texas, Arizona. San Luis and San Julio.

MICRORHOPALA RUBROLINEATA Mann. var. SIGNATICOLLIS Lec. Southern California, Arizona. Sierra El Chinche and Coral de Piedra, Sierra El Taste.

Microrhopala Melsheimeri Crotch. California, Arizona. Coral de Piedra, Sierra El Taste.

Charistena perspicua Horn. New Mexico, Arizona. San José del Cabo.

Charistena ariadne Newm. Florida, Texas. San José del Cabo.

Physonota alutacea Boh. Mexico. El Taste. The forms examined belong to the variety *cyrtodes* Boh.

Mesomphalia exclamationis Fab. Mexico. El Chinche.

Cassida bivittata Say. Middle States to Arizona. Pescadero.

Coptocycla aurichalcea Fab. Middle States to Arizona and California. Coral de Piedra and San José del Cabo.

Coptocycla signifer Herbst (*guttata* ‡ auct.). Atlantic region to Texas. Pescadero. Mr. Champion writes that *guttata* Oliv., has not been correctly determined by Boheman and subsequent authors, being an

Bruchus amicus Horn. Texas, Arizona, New Mexico. El Chinche and San Julio.

Bruchus protractus Horn (*longiventris* Sharp). Texas, Arizona. San Julio, San José de Gracia and Calmalli Mines.

Bruchus placidus Horn. Arizona. San José del Cabo and El Taste.

Bruchus desertorum Lec. Arizona. Cabo San Lucas, Baja California (Ulke).

Bruchus aureolus Horn. Desert regions of southern California. San Julio, San José del Cabo and Margarita Island.

Bruchus prosopis Lec. Southern California and Arizona. El Taste and Santo Domingo del Taste.

Bruchus leucosomus Sharp. Mexico, Guatemala, Panama. Sierra Laguna. This species belongs in the group with *discoideus*, *coryphæ* and *impiger*. The hind femora are without tooth, the male antennæ flabellate, the elytra reddish with cinereous pubescence. The pygidium has a transverse black line curved slightly forward at each end.

Bruchus Julianus n. sp. Texas. San Julio and San Ignacio.

Caryoborus Veseyi Horn. Cabo San Lucas.

Spermophagus (zabrotes) semicinctus n. sp. San José del Cabo.

TENEBRIONIDÆ.

Edrotes ventricosus Lec. This species is very variable, and has recently been divided into forms which have received new names. I have already called attention to the fact that the same species developing at different seasons will have a very different aspect. Those developing in the hot and dry season will be shining, and if pubescent or hairy, will remain so but a short time, while the specimens of the colder or wet seasons will be opaque and retain their pubescence or hair a longer time. Some localities, owing to their climate, will retain one of these variations, as shown in *Iphthimus serratus*, in the damp and cooler climate of the coast and mountain regions of Oregon and Washington. This species becomes gradually smoother as it goes south, until near San Bernardino and the hot regions bordering the Mojave Desert it is quite smooth. Unfortunately, some of the varieties of this have won new names undeservedly. One of the specimens of Edrotes before me has the surface dull and coated with a dirty white efflorescence. In species of other genera observed in nature by myself this seems dependent on seasonal influences also.

Edrotes ventricosus occurs probably along the entire eastern side of the peninsula, but specimens have been sent from San José del Cabo only.

STIBIA PUNCTICOLLIS Horn. San José del Cabo. The

EURYMETOPON PUNCTULATUM Lec. San José del Cabo.

EURYMETOPON SODALIS Horn. Arizona. San José del Cabo.

EURYMETOPON BICOLOR Horn. Southern California. San Pedro Martir.

EURYMETOPON CONVEXICOLLE Lec. Southern California. Cabo San Lucas (Ulke).

EURYMETOPON PUNCTULATUM Lec. Cabo San Lucas, Santa Maria.

EMMENASTUS PUNCTATUS Lec. Texas, Arizona. San José del Cabo. From a specimen labeled for me by Mr. Champion *lentus* Ch., scarcely differs.

EMMENASTUS PINGUIS Lec. Arizona. San José del Cabo.

EMMENASTUS LONGULUS Lec. Arizona. San Pedro Martir.

EMMENASTUS OBESUS Lec. California. San Pedro Martir and Cabo San Lucas.

EMMENASTUS MARGINATUS Casey. Baja California (Casey).

EMMENASTRICHUS n. g. CRIBRATUS n. sp.

EMMENASTRICHUS BRUNNEUS n. sp. These two species are from San José del Cabo.

BATULIUS ROTUNDICOLLIS Lec. Baja California (Ulke).

ZOPHERUS GRANICOLLIS Horn. Arizona, south of the northern boundary line, west of Yuma.

ZOPHERUS TRISTIS Lec. Arizona, California near Yuma. Baja California, locality unknown.

PHLOEODES DIABOLICUS Lec. California. San Pedro Martir.

Centrioptera speculifera Lec. San José del Cabo.

Centrioptera muricata Lec. San José del Cabo.

Centrioptera asperata Horn. Cabo San Lucas.

Centrioptera variolosa Horn. Arizona. San Francisquito.

Centrioptera seriata Lec. Nevada, Arizona, southern California. San José del Cabo.

Centrioptera angularis n. sp. El Paraiso.

Cryptoglossa verrucosa Lec. Southern California, Arizona. San José del Cabo (Fuchs).

Microschatia Championi Horn (*punctata* ‡ Horn). San José del Cabo.

Microschatia inæqualis Lec. San Pedro Martir.

Asida morbillosa Lec. Arizona. San José del Cabo.

Asida ægrota Lec. San José del Cabo.

Asida bifurca Lec. El Taste, San José del Cabo.

Asida connivens Lec. Cabo San Lucas, El Taste.

EUSATTUS EROSUS Horn. Patrocinio and Lower Purisima.

EUSATTUS PRODUCTUS Lec. Arizona. Cabo San Lucas.

EUSATTUS SCULPTUS Champion. Chihuahua, Mexico. San Pedro Martir and Cabo San Lucas. This species greatly resembles *reticulatus*, but the elytra have not the acute lateral margin as seen in that species.

EUSATTUS LÆVIS Lec. Southern California. San José del Cabo.

EUSATTUS CILIATUS n. sp. Tantilles Mountains, Big Cañon, Baja California, lat. $\genfrac{}{}{0pt}{}{32}{33}$, long. 116.

EUSATTUS SECUTUS n. sp. El Taste and San José del Cabo.

CŒLOMORPHA MARITIMA Casey. San Diego and San Quintin, 250 miles below San Diego.

CONIONTIS PALLIDICORNIS Casey. Baja California (Ulke).

ELEODES MILITARIS Horn. Comondu and near Cabo San Lucas.

ELEODES LUCÆ Lec. San José del Cabo.

ELEODES GRANDICOLLIS Lec. Arizona, California. Lower Paraiso, San Pedro Martir.

ELEODES INNOCENS Lec. Cabo San Lucas (LeConte).

ELEODES GRACILIS Lec. New Mexico, Arizona. La Chuparosa.

ELEODES GENTILIS Lec. Arizona. San Pedro Martir and San Francisquito.

ELEODES GIGANTEA Lec. California. San Pedro Martir.

ELEODES ACUTICAUDA Lec. California. San Pedro Martir.

ELEODES QUADRICOLLIS Esch. California. San Quintin and San Fernando.

ELEODES HUMERALIS Lec. California, Nevada, New Mexico, Arizona. Sierra Laguna, San Francisquito, La Chuparosa and San José del Cabo.

ELEODES CONSOBRINA Lec. Southern California. San Pedro Martir.

EULABIS PUBESCENS Lec. San Pedro Martir and Cabo San Lucas.

ARGOPORIS EBENINA n. sp. Sierra El Chinche, Pescadero and El Taste.

ARGOPORIS INCONSTANS n. sp. San Diego, Cal. San Esteban, San Francisquito and San José del Cabo.

CERENOPUS CONCOLOR Lec. Nevada, California. San José del Cabo.

CERENOPUS ATERRIMUS n. sp. Santo Domingo del Taste and San José del Cabo.

RHINANDRUS GRACILIS Lec. San José del Cabo and El Taste.

DOLIEMA PLANA Fab. (*Lecontei* Horn). Widely distributed in Arizona and California, extending into Mexico and Cuba. San José del Cabo. The generic name replaces Sitophagus and Adelina, formerly used in our fauna.

DOLIOPINES n. g. CUCUJINUS n. sp. San José del Cabo.

EUPSOPHUS CASTANEUS Horn. Baja California (Ulke).

CYNÆUS ANGUSTUS Lec. Southern California, Arizona. San Quintin (Fuchs). *C. opacus* Champion does not differ from this.

CYNÆUS DEPRESSUS Horn. San Diego, Fort Yuma. San Quintin (Fuchs).

BLAPSTINUS DISCOLOR Horn. *elongatus* Casey. California, Nevada. San José del Cabo. My type of this species is one of those accidental varieties in which the head, thorax and legs are dull red.

BLAPSTINUS LECONTEI Muls. Texas, Arizona, southern California. San Pedro Martir.

ULUS CRASSUS Lec. California, Arizona, Utah. San José del Cabo.

ULUS OBLIQUUS Lec. Cabo San Lucas (Le Conte).

TRICHOTON SORDIDUM Lec. Utah, Arizona. San Quintin (Fuchs).

NOTIBIUS GRANULATUS Lec. Southern California, Arizona. Comondu and San José del Cabo.

NOTIBIUS OPACUS Lec. San Francisquito and San José del Cabo.

NOTIBIUS SULCATUS Lec. Southern California, San Diego. San Pedro Martir, Calmalli Mines. *Conibius alternatus* Casey is an accidental variation not rare in females of this species.

NOTIBIUS COSTIPENNIS n. sp. Magdalena Island and Baja Purisima.

NOTIBIUS REFLEXUS n. sp. San José del Cabo.

ECHOCERUS MAXILLOSUS Fab. Atlantic States, Cuba, Mexico. Sierra El Chinche.

TRIBOLIUM FERRUGINEUM Fab. Widely distributed, almost cosmopolitan. San José del Cabo.

ULOSONIA MARGINATA Lec. Texas, Arizona. San José del Cabo.

MEROTEMNUS ELONGATUS Horn. Sierra El Chinche 2,000 feet.

ALPHITOBIUS PICEUS Oliv. Widely distributed by commerce. San José del Cabo.

ANÆDUS ROTUNDICOLLIS Lec. Arizona. El Taste.

PLATYDEMA SUBQUADRATUM Motsch. This is the species now in our lists as *janus* Fab. Mr. Champion has recently given some attention to the Central American species and adopts the above name for our form, although it has not been determined to what species *janus* should be applied. Florida, Texas, New Mexico, Arizona, Mexico or Nicaragua. San José del Cabo and Pescadero.

HELOPS PINGUIS n.sp. Coral de Piedra, Sierra El Taste.

CISTELIDÆ.

PHEDIUS OPACULUS n. sp. Sierra Laguna, El Taste and Pescadero.

ALLECULA SORDIDA n. sp. Coral de Piedra, Sierra El Taste.

HYMENORUS RUFICOLLIS Champion. Arizona, Northern Mexico. San José del Cabo and San Quintin.

HYMENORUS CONFERTUS Lec. San José del Cabo and Comondu.

HYMENORUS PLANULUS n. sp. El Taste.

OTHNIIDÆ.

OTHNIUS MEXICANUS Horn. San Julio, Baja California (Ulke).

LAGRIIDÆ.

STATIRA SUBNITIDA Lec. Cabo San Lucas (Le Conte).

MONOMMIDÆ.

HYPORHAGUS OPACULUS Lec. El Taste.

MELANDRYIDÆ.

EUSTROPHUS ARIZONENSIS Horn. Arizona. La Chuparosa.

ŒDEMERIDÆ.

Calopus aspersus Lec. Baja California (Ulke).

Nacerdes melanura Linn. Widely diffused by commerce. San José del Cabo.

Oxacis fuliginosa Lec. Cabo San Lucas (LeConte).

Oxacis lucana Lec. (*Probosca* ‡). San José del Cabo.

MORDELLIDÆ.

Mordella scutellaris Fab. Canada to California. Santo Domingo del Taste, Comondu.

Mordellistena vilis Lec. Oregon to southern California. San Jorge and El Chinche.

Mordellistena tosta Lec. Canada to Texas, Fort Yuma, Cal. El Taste.

Anaspis rufa Say. Canada to Alaska and Texas, southern California. San Borja.

Anaspis pusio Lec. Arizona, southern California. San Esteban and San José del Cabo.

NOTOXUS MONODON Fab. Widely distributed in the United States. Texas, Utah, Arizona, California. San José del Cabo.

ANTHICUS ELEGANS Laf. Colorado, Texas. Calmalli Mines.

ANTHICUS CONFINIS Lec. Utah, Arizona, southern California. San Francisquito.

ANTHICUS ICTERICUS Laf. Middle Atlantic States. San José del Cabo.

ANTHICUS NANUS Lec. Utah, Colorado, Texas, Arizona. Coral de Piedra, Sierra El Taste.

MELOIDÆ.

MELOE sp. This is represented by a female of a rather large species, quite smooth but opaque. It is doubtless allied to *cordilleræ* (sublævis *Lec.*). It will not be described, as a male should be at hand to determine its relationships. Sierra El Chinche.

NEMOGNATHA LURIDA Lec. Texas, Arizona. San Luis.

NEMOGNATHA APICALIS Lec. Texas, California. San Luis.

NEMOGNATHA PIEZATA Fab. Florida, Texas, Colorado, Arizona, California. San Luis.

NEMOGNATHA NIGRIPENNIS Lec. California. Rancho Viejo. A very variable species in color, from all black to all yellowish. The specimen before me has the head and thorax black, elytra yellow.

NEMOGNATHA SPARSA Lec. Colorado, New Mexico, Texas. San Quintin and El Chinche.

MACROBASIS VIRGULATA Lec. Texas. Cabo San Lucas (Ulke).

Macrobasis tenuilineata n. sp. Sonora, Mexico. San José del Cabo.

Epicauta pedalis Lec. Texas, Arizona. Cabo San Lucas (LeConte).

Cantharis mutilata Horn. Arizona. San Julio.

Cantharis Childii Lec. Sacramento Valley, San Diego. Margarita Island, San Julio.

Calospasta decolorata n. sp. Calmalli Mines.

Calospasta mirabilis Horn. Nevada, Los Angeles County, San Diego County, Mexico. San Julio.

Tegrodera erosa Lec. Owens Valley, Cal., southward to San Diego. San José de Gracia. The forms from the latter region are similar to those from San Diego, having the median elytral black band indistinct.

Pyrota trochanterica n. sp. Sierra El Chinche 2,000 feet.

Tetraonyx dubiosus n. sp. El Chinche.

RHIPIPHORIDÆ.

Rhipiphorus cruentus Germ. Widely distributed in

OTIORHYNCHIDÆ.

Epiacærus lucanus n. sp. Sierra El Chinche, Pescadero and San José del Cabo.

Anomadus obliquus Horn. El Taste and San José del Cabo.

Eupagoderes lucanus Horn. San José del Cabo.

Rhigopsis simplex n. sp. Calmalli Mines.

Orimodema protracta Horn. Colorado, New Mexico, Mojave, Cal. San Pedro Martir.

Eucyllus vagans Horn. Utah, Arizona, Owens Valley, Cal. Calamajuet.

Geodercodes hispidus n. sp. San Jorge.

Thricolepis? seminuda n. sp. San Julio.

Pandeletejus cinereus Horn. Texas, Arizona. Sierra El Chinche and El Taste.

Scythropus delicatulus n. sp. El Taste.

Mitostylus gracilis n. sp. Coral de Piedra, Sierra El Chinche and San José del Cabo.

Polydrosus peninsularis n. sp. Coral de Piedra, El Taste, San José del Cabo.

CURCULIONIDÆ.

Sitones sordidus Lec. Oregon, California. San Pedro Martir.

Macrops echinatus Dietz. Texas. El Chinche.

Centrocleonus porosus Lec. Cabo San Lucas (LeConte).

Lixus perforatus Lec. Southern California. Coral de Piedra.

LIXUS PLEURALIS Lec. Arizona. Cabo San Lucas (LeConte).

DORYTOMUS INÆQUALIS Casey. Baja California (Ulke).

OTIDOCEPHALUS ULKEI Horn. Pescadero.

MACRORHOPTUS HISPIDUS Dietz. San Diego, Cal. Arizona. Baja California (Ulke).

ANTHONOMUS PENINSULARIS Dietz. Calmalli Mines.

ANTHONOMUS PERVILIS Dietz. San Julio.

ANTHONOMUS EBENINUS Dietz. San Esteban.

ANTHONOMUS OCHREOPILOSUS Dietz. Baja California (Ulke).

ANTHONOMUS LIGATUS Dietz. Arizona. Baja Purisima.

TYCHIUS SETOSUS Lec. Southern California, Arizona. San Julio and Calmalli Mines.

SIBYNES FULVUS Lec. Arizona. Coral de Piedra and El Taste.

CALANDRIDÆ.

CACTOPHAGUS VALIDUS Lec. Arizona, southern California. Sierra El Chinche.

SPHENOPHORUS SIMPLEX Lec. Utah, California. San José del Cabo.

SCYPHOPHORUS ACUPUNCTATUS Gyll. Arizona. San José del Cabo.

SCYPHOPHORUS ROBUSTIOR Horn. San Diego County, San José del Cabo.

SCYPHOPHORUS YUCCÆ Horn. San Bernardino County, Arizona, San José del Cabo.

CALANDRA ORYZÆ Fab. Widely diffused by commerce. San José del Cabo.

COSSONIDÆ.

APOTREPES DENSICOLLIS Casey. San Ignacio.

BRENTHIDÆ.

BRENTHUS LUCANUS Horn. Pescadero and Cabo San Lucas.

BRENTHUS PENNINSULARIS Horn. With the preceding.

SCOLYTIDÆ.

PLATYPUS RUGULOSUS Chap. Mexico. Cabo San Lucas (LeConte).

HYPOTHENEMUS STRIATUS Lec. Illinois, California. Cabo San Lucas (LeConte).

ANTHRIBIDÆ.

ANTHRIBUS VAGUS n. sp. El Taste.

BRACHYTARSUS GRISEUS Lec. San José de Gracia. The specimens are so rubbed that the determination is uncertain.

DESCRIPTIONS OF NEW SPECIES.

The following pages contain the descriptions of all those species believed to be new to science contained in the series sent me for examination. At the same time I have described a number of new species from regions in which the fauna is more or less related to that under consideration. In every instance in which a species is described from the series in the collection of the Academy the type is the specimen or specimens making part of that collection.

ANCHONODERUS APICALIS n. sp.

Form of *quadrinotatus* but more depressed, piceous, legs pale, elytra fusco-testaceous the apex irregularly piceous. Antennæ piceous, the basal joint pale. Mouth parts pale. Head piceous smooth. Thorax cordate, broader than long, disc slightly convex, a finely impressed median line, surface alutaceous, very sparsely finely punctate. Elytra finely striate, intervals flat, finely not closely punctate. Prothorax beneath and metapleuræ smooth, abdomen sparsely punctate. Epipleuræ and legs pale. Length, .28 inch; 7 mm.

surface smooth. Elytra very indistinctly six-striate, striæ not punctured, the sutural alone entire. Body beneath black, smooth. Length, .11 inch; 3 mm.

This species more nearly resembles a Blechrus by its slender less depressed form and by the very narrow thoracic margin, but it cannot be associated with that genus as the base of the thorax is truncate. It differs from all the known species of Apristus by its decidedly blue color and the very feebly impressed striæ.

San José del Cabo.

CALLIDA RUGICOLLIS n. sp.

Oblong, depressed, piceous black, feebly shining, a slight greenish surface lustre more evident on the head and thorax. Antennæ black, first joint testaceous beneath. Head nearly smooth. Thorax wider than long, slightly wider at base than at apex, sides moderately arcuate, feebly sinuate posteriorly, disc convex, slightly depressed along the sides, margin reflexed, median impressed line entire, surface with transverse and slightly undulating rugæ. Elytra finely striate, striæ entire, finely and closely punctate, intervals flat, very evidently punctate, less distinctly toward the apex, third interval with four dorsal punctures. Body beneath smooth and shining, with evident æneous lustre, a few punctures at sides of metasternum. Length, .40–.44 inch; 10–11 mm.

This species belongs to the group in which the males have two or three and the females two anal setæ. It seems to be allied to *obscura* Dej. by the punctate elytral intervals and the transversely wrinkled thorax. *C. planulata* Lec. is also probably related, but that species is not now in hand for comparison.

Coral de Piedra, Sierra El Taste, Pescadero and San José del Cabo.

THERMONECTES PENINSULARIS n. sp. Plate viii, fig. 10.

Oval, moderately convex, shining, yellowish testaceous, elytra closely irrorate with small black spots. Head pale, a small vertical transverse piceous spot, occiput narrowly piceous. Thorax almost entirely yellow, the usual apical and antebasal black lines closely approximated and very near the base. Elytra closely irrorate with black spots, the border pale except near the apex, without trace of transverse fascia except a larger black spot one-third from apex, surface of elytra smooth, the rows of coarse punctures nearly obliterated. Body beneath rufescent, prosternum, front and middle legs pale. Length, .41 inch; 10.5 mm.

The single specimen seen is a male. In general appearance it resembles *ornaticollis*, but is smaller and broader. It differs from all the species known to me belonging to the same group, by the absence of the elytral fascia and the peculiar style of thoracic ornamentation.

San José del Cabo.

but similarly pubescent, fimbriate at apex. Abdomen above sub-opaque, finely but not densely punctate, each segment with a double series of oblong velvety spots; beneath more shining and more sparsely punctate. Legs black. Length, .55 inch.; 14 mm.

The male has the last ventral truncate and vaguely emarginate. This species belongs to the division Platydracus Thoms., which Dr. Sharp does not admit as of full generic value. In form the above described species resembles *nigrellus*, but differs in the form of the head and the presence of velvety spots on the abdomen. From the arrangement of our native species suggested by me (Trans. Am. Ent. Soc. vii, p. 186) *lucanus* will be found most closely related to *tomentosus*, but the latter is more robust and has no smooth median thoracic line.

Occurs at La Chuparosa.

SCAPHISOMA PENINSULARE n. sp.

Form of *terminatum* but smaller, piceous black shining, elytra narrowly paler at apex, legs and two basal joints of antennæ pale. Head and thorax smooth. Elytra relatively coarsely, sparsely punctate, the punctures less distinct at base, sutural striæ curved outward at base, one-third toward humeri. Body beneath smooth. Length, .04 inch; 1 mm.

This species is evidently related to *desertorum* Casey, but is smaller and with more coarsely punctured elytra and a shorter basal extension of the sutural stria.

Sierra Laguna.

SCAPHISOMA APICALE n. sp.

Form of *convexum*. Body beneath rufo-testaceous, legs paler, head and thorax slightly darker, elytra piceous broadly tipped with rufo-testaceous. Head smooth, thorax microscopically punctulate. Antennæ pale, the outer joints darker. Elytra finely and moderately closely punctate. Metasternum and first ventral segment sparsely finely punctulate. Length, .10 inch; 2.5 mm.

This form is related to *punctulatum*, but differs from all our species by its coloration. In the specimens examined there is uniformity except that the thorax may be somewhat darker than at the sides.

La Chuparosa.

SAPRINUS OPACUS n. sp.

Broadly oval, convex, black, opaque, punctured. Head densely punctate, front not margined. Thorax densely punctate, very slightly strigose at the sides. Elytra opaque, punctures smaller than those of the thorax and less closely placed, especially in the circum-scutellar region; sutural striæ extremely fine, obliterated at basal third, dorsal striæ four, the outer side of each raised in a fine carina, the first longer, arcuate and nearly entire, second and third shorter, fourth much shorter and with a distinct arch at base; internal subhumeral short, oblique, the outer long and fused with the marginal. Pygidium closely punctate like the thorax. Prosternum nearly flat.

TERETRIUS LEVATUS n. sp.

Cylindrical, piceous black, shining, legs brown. Head finely not closely punctate. Thorax sparsely punctate, fine at apex and sides, coarser near the base. Elytra more coarsely punctate, the punctures finer near sides on apex, a smooth umbonal space, a short very oblique stria at base. Pygidium sparsely punctate. Mesosternum distinctly margined in front, sparsely coarsely punctate. Anterior tibiæ 4-denticulate, middle tibiæ 4-spinose, hind tibiæ bispinose near apex, with a smaller spine at middle. Length, .10 inch; 2.5 mm.

A species resembling *obliquulus* in most of its characters, but much smaller and with one less spine on the middle and hind tibiæ, the spines being at the same time more slender.

San José del Cabo.

ANORUS PARVICOLLIS n. sp.

Elongate, parallel, yellowish testaceous, head rufescent, under body slightly piceous, surface shining. Head sparsely punctate, with long, sparse hairs. Thorax smaller in bulk than the head, but, excepting the eyes, slightly wider, twice as wide as long, not broader at base, sides obtusely angulate at middle, lateral edge rounded, surface sparsely punctate with long sparse hairs. Elytra broader than the thorax, but scarcely wider than the head across the eyes, surface vaguely striate, slightly wrinkled near the apex, intervals with sparsely placed short erect hairs. Body beneath more or less piceous, very sparsely pubescent, the segments 3–4–5 of abdomen more closely pubescent in their distal half. Legs sparsely pubescent with longer flying hairs. Length, .32 inch; 8 mm.

This insect has not yet occurred in Lower California, but from the fact that it was collected at Fort Yuma may be expected. Differs from *A. piceus* in the form of the thorax and the scarcely pubescent surface.

Occurs in Arizona near Fort Yuma.

LACON ILLIMIS n. sp.

Brown or ferruginous, subopaque, sparsely clothed with yellowish, scale-like hairs, antennæ and legs paler. Head coarsely and closely punctate. Thorax a little longer than wide, sides arcuate in front, from middle to base nearly straight, margin crenulate, hind angles slightly prominent externally, without carina, disc coarsely, closely punctate, a depression in front of the scutellum. Elytra not distinctly striate, the intervals faintly indicated, punctures coarse, closely placed and in feebly indicated rows with closely placed and but little finer punctures in the intervals. Body beneath with coarsely, closely and equally disposed punctures. Propleuræ without groove for the tarsus. Length, .28–.32 inch; 7–8 mm.

By all its structural characters this species should take its place near *Lezeleucii* as given by Candeze, but differs from that by its smaller size and the elytral sculpture. The elytral punctures are so closely placed that it is diffiwider at base than the thorax, humeri rounded, sides parallel, arcuately narrowing at apical third with the margin rather coarsely serrate, apex obtuse, disc convex without costæ or foveæ except the usual basal depression, the surface not closely submuricately punctured, the intervals alutaceous. Body beneath coarsely and closely punctate with few hairs, the abdomen smoother and with more cupreous luster at the sides. Last ventral with an entire lateral margin and a well defined supplementary margin serrate near the apex. Length, .27 inch; 7 mm.

Male.—Anterior femur with a broad triangular tooth serrate on its distal edge, the tibia slightly arcuate. Last ventral with an acute angle each side, the interval between them bisinuate.

This species belongs with those in which the last ventral segment has an entire edge without serrulation and where the elytra have neither discal foveæ nor costæ. In a general way it resembles *analis.*

One specimen. San José del Cabo.

CHRYSOBOTHRIS LUCANA n. sp.

Form resembling *chrysoela* and but little larger, metallic green or with the elytra blue, moderately shining, elytra with an opaque black band not reaching the suture or side, broadest internally, a similar band in front of apex, behind the base an oval spot, united to the median band by a slight isthmus. Head rather coarsely and closely punctate, a vague transverse ridge in the female; clypeus semicircular each side, an acute incisure at middle. Thorax one-half wider than long, sides somewhat sinuous, anterior angles oblique, surface moderately coarsely, but not closely punctate. Elytra with nearly parallel sides, arcuately narrowing at the apical third where the margin is rather coarsely serrate; disc not costate nor foveate, a vague basal fovea, surface less coarsely and closely punctate than the thorax. Body beneath green or blue, coarsely punctate, smoother on the prosternal flanks and the anterior portion of each ventral segment. Margin of last ventral acute, not serrate. Length, .32 inch; 8 mm.

Female.—Anterior femur broadly toothed, the outer edge serrulate. Last ventral truncate, the angles of the truncation acute and moderately prominent.

Male.—Unknown.

Sierra El Chinche (2,000 feet) and San Jose del Cabo.

This species belongs to a small group represented by four forms peculiar to the fauna of western Boreal-America and three to Mexico, one of the latter occurring in Arizona. The essential characters of the group are: last ventral segment not serrulate at the sides, elytra separately rounded at apex without trace of costæ or discal foveæ. With the exception of *prasina* the elytra in all have three purple-black fasciæ more or less broken according to the species.

The forms known may be arranged in the following

Anterior angles not obliquely truncate; sides slightly arcuate; elytral bands interrupted.
    Surface somewhat dull. *socialis.*
    Surface shining. *trisignata.*
Elytra without darker fasciæ.
    Body bright green; anterior angles of thorax not obliquely truncate. *prasina.*
    Body bicolored above; anterior angles of thorax obliquely truncate. *bicolor.*

From specimens examined by me *socialis* and *trisignata* seem not to be distinct specifically.

ACMÆODERA SCAPULARIS n. sp. Plate viii, fig. 6.

Similar in form to *flavomarginata*, but rather more attenuate posteriorly, piceous black with faint bronze tinge. Head coarsely closely punctate, front sparsely hairy and longitudinally impressed. Thorax more than twice as wide as long, wider slightly behind the middle, sides obliquely arcuate in front, behind the middle slightly sinuate, the hind angles rectangular, lateral margin acute and slightly reflexed, concealed near the hind angles, disc with a moderately deep triangular depression at middle and a deep oblique impression each side, surface coarsely and moderately closely punctate, very sparsely hairy, a yellow spot near the angulation. Elytra as wide as the thorax at base, gradually narrowed with but slight arcuation to apex, the margin from middle to apex serrate, disc slightly depressed, fifth interval finely costiform nearly to apex, punctures coarse and close, larger and closer exterior to the costa, the intervals smooth with a single row of punctures each bearing a short hair, the intervals near apex exterior to the costa muricate, surface muculate with yellow—beginning behind the humeri the marginal interval is yellow nearly to apex with an interruption opposite the last ventral suture, near the middle on each side the marginal line expands in an oblique plaga of irregular form, sending a small branch nearly to the suture, a yellow spot each side of the scutellum, a smaller one posteriorly, one fourth from apex an irregular arcuate band behind which is a small round spot. Body beneath brown bronze, shining, moderately coarsely not closely punctate, the propleural punctures coarser. Anterior margin of prosternum trisinuate and forming each side an obtuse short spine. Surface beneath and legs sparsely clothed with moderately long whitish hairs. Last ventral with single margin. Length, .52 inch; 13 mm.

The markings of this species resemble those of *flavosticta* Horn (nec *flavosticta* ‖ Waterh.) From the characters given this species must be placed in the group Acmaeoderæ sinuatæ (Trans. Am. Ent. Soc. vii, 1878, p. 4), and, while related to *flavomarginata* by most of its characters, it seems best placed after *cuprina* which is the only species in our fauna with the sub-costiform elevation, although the character is faintly indicated, also, in *flavomarginata*.

Sierra El Chinche.

ACMÆODERA STIGMATA n. sp. Plate vii, fig. 2.

vals uniseriately punctulate flat at middle, convex at sides and apex. Body beneath piceous black, slightly bronzed, punctuation rather coarse in the thoracic regions. Abdomen rather finely and closely punctate, less closely on the first two segments, at sides with moderately long, sparse, whitish hair. Prosternum in front trisinuate, a mammiliform elevation each side limiting the points of sinuation. Last ventral with a slight ridge within the apical margin. Length, .31 inch; 8 mm.

This species belongs to the group in which the anterior edge of the prothorax beneath is trisinuate and with a distinct tubercle each side. It must be associated with those species in which the thorax is not wider than the elytra, having the lateral margin inferior and without yellow spot at the side.

It may be known from any species in the group, and, in fact, from any in our fauna, by the cylindrical and convex form and the red marginal spot one-third from the apex.

San José del Cabo. A specimen from Tucson, Ariz. (Wickham, 231), has a small red spot between the humerus and the larger spot.

ACMÆODERA BIVULNERA n. sp.

Closely resembling *stigmata* or *culta* in form, color dark blue beneath, elytra bluish or slightly greenish with a moderately large red spot, one-third from apex, head and thorax piceous slightly bronzed, surface moderately shining. Front convex, moderately closely punctate, sparsely pubescent. Thorax about one-half wider than long, sides gradually, arcuately narrowed to the apex, disc convex without depressions, a slight fovea at base on each side, surface rather sparsely and finely punctate at middle, gradually more coarsely and closely at the side, pubescence short and sparse. Elytra slightly wider at the umbones than the thorax, sides nearly parallel, narrowing at apical third, surface with striæ of punctures not densely placed, the punctures coarser toward apex and at the sides where the striæ are impressed and the intervals convex, a single row of finer punctures in the intervals, pubescence scarcely evident. Prosternum trisinuate in front, forming a short broad lobe at middle, which is broadly emarginate with angles rounded, surface at middle coarsely and closely punctate, the flanks with shallow variolate punctures. Meso-metasternum coarsely punctured at middle, with dense silken white hair at the sides. Abdomen smooth and sparsely punctate at middle, densely punctate at sides, with white silken hair. Length, .25–.30 inch; 6.25–7.50 mm.

This species resembles *stigmata* very closely, and might readily be mistaken for it without an examination of the prosternum. The present species is, however, more shining, the thorax more finely punctate and the pubescence at the sides of the body more dense. One specimen has a small red spot immediately in front of the larger spot.

Occurs near Tucson, Ariz.

each side not reaching the apex or base, surface coarsely and rather closely punctate, becoming cribrate at the sides, sparsely hairy. Elytra narrower at base than the thorax, sides gradually arcuately narrowing to apex, margin serrate, disc with rows of coarse and deep closely placed punctures nearly as wide as the intervals, these latter uniseriately punctate, each puncture with a black hair; color yellow, marked with round black spots arranged in three rows, a sutural row of about seven spots, the largest scutellar, a median row beginning at the umbone, slightly sinuous, of six spots, a marginal row of five spots, the anterior one slightly separated from the margin. Anterior margin of prosternum trisinuate, at middle coarsely and closely punctate, flanks with shallower variolate punctures. Metasternum more coarsely and closely punctate, densely at the sides. Abdomen coarsely not closely punctate, punctures equally placed. Body beneath sparsely hairy, last ventral segment with a double margin at apex, the additional edge forming a plate projecting beyond the true edge. Length, .47 inch; 12 mm.

The specimen before me is a male from Texas, given me by Mr. Ulke.

In addition to the characters given above, it will be observed that along the basal edge of the elytra the surface is more closely punctate. Among our species, *maculifera* should be placed near *amplicollis*, with which it agrees closely in form and structural characters, although a little flatter. The species is unique, as far as known to me, in the style of elytral ornamentation.

Mr. Waterhouse figures a form which he considers a variety of *delectabilis* Waterh., resembling *guttifera*, above described, so closely that they are probably the same, but it is not quite so clear that either is merely a variety of *delectabilis*. Figures will be found on pl. ix, Biol. Cent. Amer., vol. iii, pt. 1.

ACMÆODERA CLAUSA n. sp. Plate vii, fig. 3.

Similar in general form to *ornata*, but with narrower thorax and slightly more convex, color piceous slightly coppery bronze, elytra less distinctly so, elytra and sides of thorax ornate with yellow. Front feebly convex, closely punctate, a small smooth space at middle, sparsely hairy. Thorax fully twice as wide as long, widest at base, sides regularly arcuately narrowed from base to apex, lateral margin not visible from above except near the base, disc rather flat, a vague triangular depression at middle, at sides flattened, a fovea each side near the base and a post-apical impressed line extending from angle to angle, surface coarsely and very closely punctate at sides, becoming finer and sparser at middle, yellow border at sides not reaching the front angles. Elytra gradually narrowed from base to apex, sides serrulate, disc slightly convex, striæ slightly impressed at sides and apex, punctures of striæ rather fine, becoming much coarser from with the thorax not wider than the elytra and margined at the sides with yellow. It is, therefore, systematically related to *tuta* and *Hepburnii*, from both of which it differs, apart from its markings, by the much more prominent double margin of the last ventral segment.

Occurs at San José del Cabo and Coral de Piedra, Sierra el Taste.

ACMÆODERA CRIBRICOLLIS n. sp. Plate viii, fig. 4.

Moderately elongate and convex, piceous, faintly bronzed on head and thorax and beneath, sparsely invested with short erect whitish hairs. Front convex, coarsely and closely punctate, occiput carinate. Thorax unicolored, twice as wide as long, widest behind the middle, sides arcuate and narrowing to the apex, sinuate behind the middle, the hind angles (directly from above) rectangular, lateral margin very narrow not visible from above, disc convex, a vague depression at middle, a faint oblique depression each side, a small fovea each side near the base, surface densely cribrately punctured and opaque. Elytra narrower at base than the thorax at middle, sides parallel to middle then arcuately narrowing to base, margin serrate, striæ with coarse deep, closely placed punctures, the intervals slightly convex and scarcely wider than the striæ, each with a row of setigerous punctures, surface ornate with yellow in a style similar to *variegata*. Prosternum coarsely and closely punctate, anterior margin truncate. Metasternum coarsely and densely punctate. Abdomen moderately coarsely and closely punctate at sides, a little less so at middle. Last ventral with single apical margin. Body beneath sparsely cinereo-pubescent. Length, .40 inch; 10 mm.

This species is the most obtuse in front of any known to me. The thoracic sculpture is of rare occurrence, densely cribrate and opaque. By the characters used by me in an analytical table of the group its position should be near *culta* et seq., all of which are scarcely more than half the length of this one, while *gemina* alone has similar thoracic sculpture. By facies the species is best placed near *obtusa* and *consors*.

One specimen from Texas; locality unknown.

ACMÆODERA NEBULOSA n. sp.

Form of *culta*, piceous, opaque, a feeble bronze lustre to the head, thorax and under side, elytra reticulate with yellow markings. Antennæ with joints gradually wider, the fifth not abruptly wider than the fourth. Head cribrately punctured, sparsely hairy, front not impressed. Thorax uncolored, a little more than twice as wide as long, scarcely narrower at apex than at base, sides arcuate, lateral margin entirely obliterated, disc convex without median or lateral impressions, a small fovea each side at base, surface densely but not deeply punctate, resembling crowded reticulations, sparsely hairy. Elytra not wider than the thorax, parallel, gradually narrowed at apical third and serrulate, disc moderately convex with striæ of the species in the "truncatæ," while the structure of the antennæ and the absence of thoracic margin relate it to *gemina*, from which it differs in its larger size, different elytral ornamentation (that species being vittate), and the absence of lateral thoracic spot.

Two specimens from Napa County, Cal.

ACMÆODERA INSIGNIS n. sp.

Form of *culta*, dull black, opaque, elytra ornate with yellow spaces. Antennæ as in *gemina*, the fifth joint not abruptly wider than the fourth. Front convex, obsoletely reticulate, sparsely hairy. Thorax unicolored, about a third wider than long, very little narrower at apex, sides arcuate, lateral margin obliterated in apical half, disc convex without impressions, the basal foveæ relatively large and deep, surface reticulately punctured but near the sides somewhat cribrate, surface sparsely hairy. Elytra not wider than the thorax, sides slightly convergent, arcuately narrowing at apical third, margin serrulate, surface striate, striæ with moderately coarse punctures not closely placed nor deep the intervals slightly convex wrinkled and with a row of punctures bearing a short seta as in *culta*, surface ornate with yellow forming a space near the base from the first to fifth striæ extending nearly a third toward apex emitting a branch under the umbone, a narrow band at middle oblique backward from the suture, a spot, single or divided in front of apex, a smaller spot at apex. Prosternum truncate, indistinctly coarsely punctate, the flanks reticulate. Metasternum with shallow reticulations bearing elongate scales. Abdomen indistinctly reticulate, and with elongate scales those at the sides white, at middle yellow. Last ventral with single apical border. Length, .16 inch; 4 mm.

By the prosternum and structure of the antennæ this species is related to *gemina* and *nebulosa*, and is remarkable in having the vestiture of the under side scale-like and not hairy.

One specimen found on cactus, San Raymundo.

ACMÆODERA DELUMBIS n. sp.

Closely resembling *gibbula* in form and coloration, differing as follows: Thorax more coarsely and closely punctate. Elytra with a row of five yellow spots on each side, centering on the fourth interval, a row of three spots on the ninth or widest interval also yellow, red in *gibbula*, a marginal row of four yellow spots. Prosternum as in *gibbula*. Metasternum at sides coarsely and moderately closely punctate, sparsely hairy. Abdomen rather finely punctate not much more closely at sides than at middle, the pubescence at sides sparse and not conspicuous. Last ventral as in *gibbula*. Length, .47 inch; 12 mm.

The most conspicuous differences are that in this species the sides of the abdomen are not conspicuously pubescent and the sides of the elytra have the spots yellow and not red. The last named character may not be perlum not carinate. Elytra slightly sinuate behind the humeri, the apices obtuse scarcely visibly serrulate, surface closely submuricately granulate. Body beneath similar in color to the upper surface. Prosternum moderately coarsely punctured, the sides of metasternum more coarsely, abdomen more finely and less closely slightly undulating on the first two segments. Spaces of white pubescence are found along the under margin of prothorax, the mes-epimera, outer side of metasternum and coxæ plate and at the front angle of each ventral segment. The suture between the first two ventrals well marked at both sides. Length, .35 inch; 9 mm.

This species has the antennæ serrate beginning at the fourth joint, the lower portion of the bifid claw not strongly inverted, the pygidium has no projecting carina, thorax slightly impressed at middle, the suture between the first two ventrals plainly visible at the sides. It is therefore closely related to *pulchellus* and *Walsinghami*, and differs from the former by the obtuse pygidium and the uniformly colored elytra and from the latter by the absence of pubescent spots.

Coral de Piedra, Sierra El Taste and Pescadero.

PLATEROS SANGUINICOLLIS n. sp.

Black, thorax and scutellum bright red. Disc of thorax irregular showing a tendency to approximate the ornamentation of Eros, the hind angles slightly prominent externally. Elytra finely costate as usual in Plateros, the intervals feebly reticulate. Body beneath more shining than above. Legs black, anterior femora at base yellow. Length, .20 inch; 5 mm.

In the female the antennæ are shorter than in the male, the joints 4 to 10 as broad as long.

San José del Cabo and Sierra El Chinche 2,000 feet.

TELEPHORUS DECIPIENS n. sp.

Black, moderately shining, sparsely pubescent, thorax reddish-yellow with a median triangular space, the base anterior. Thorax wider than long, scarcely perceptibly punctate, a slight median depression near the base, on each side of which the disc is more convex. Elytra scabrous, smoother at base. Body beneath and legs black. Length, .28 inch; 7 mm.

In this species the claws are similar on all the feet and broadly obtusely toothed at base. It belongs to LeConte's division A (Trans. Am. Ent. Soc., ix, 1881, p. 51), and by the broad thorax must be placed near *dentiger*. It, however, has considerable superficial resemblance to *oregonus*, but differs in the form of the claws.

San Pedro Martir Mountains.

POLEMIUS LANGUIDUS n. sp.

Oblong, broader behind, yellow slightly reddish antennæ, tibiæ and tarsi with the last two ventral segments piceous. Head smooth, a darker band between the eyes. Thorax one-half wider than at apex, sides arcuate gradually rounding, these from middle to base slightly sinu-

ATTALUS SETOSUS n. sp.

Above in great part red, a median thoracic space suddenly constricted at base, the scutellum and space each side piceous. Antennæ slender feebly serrate, piceous, the three basal joints in part paler. Head oval, not rostrate, piceous except at mouth. Thorax transversely oval, sparsely finely punctate and with fine short pubescence. Elytra slightly wider behind, very sparsely finely punctate, with extremely minute pubescence and with short erect black setæ sparsely scattered. Body beneath and legs black, abdomen red. Length, .10 inch; 2.5 mm.

This species bears some resemblance to varieties of *humeralis*, but differs from that and any other species in our fauna by the setæ which are found on the elytra.

San José del Cabo.

ATTALUS UNICOLOR n. sp.

Piceous, distinctly bronzed, moderately shining. Antennæ slender, feebly serrate, piceous, four basal joints pale beneath. Head oval, not rostrate. Thorax transversely oval, moderately convex, minutely alutaceous, sparsely punctate. Elytra slightly wider behind, surface slightly scabrous, with sparsely placed short, black, erect hairs. Body beneath black, slightly bronzed. Femora except at knees and the posterior tibiæ black, anterior and middle tibiæ partly, tarsi entirely testaceous. Length, .08 inch; 2 mm.

This species is notable in its uniform color with bronzed surface, resembling in this respect some *Malachius*.

One male. La Chuparosa, near San José del Cabo.

CYMATODERA PURPURICOLLIS n. sp.

Brownish, head and thorax metallic blue, the latter more distinctly so. Antennæ slender, joints three to eleven not differing notably in length, the second very little shorter. Head oval, moderately closely but not deeply punctate, surface sparsely pilose. Thorax one-half longer than wide at base, broader at apex with the usual broad constriction in front of and behind the middle, at base bituberose, surface nearly smooth with faint traces of transverse wrinkles and sparsely scattered fine punctures bearing erect hairs. Elytra not wider at base than the thorax, body apterous, sides gradually divergent, apices very obtuse, surface with striæ of moderately coarse not closely placed nor deeply impressed punctures which become obsolete at the middle near the suture, but extend two-thirds to apex near the sides, intervals with very sparsely placed fine punctures bearing erect hairs, color pale brown with a narrow yellow band with irregular edges extending slightly arcuately outward and backward from the suture. Body beneath brownish. Mesosternum coarsely punctured. Abdomen indistinctly punctured, a yellow spot at the side of each segment. Legs brown, femora at base, tibiæ and tarsi paler. Length, .46 inch; 11.5 mm.

three transverse narrow yellow bands, the anterior turning down along the suture. Antennæ entirely black. Head oval, not closely punctate, sparsely hairy, palpi pale. Thorax oval, as wide as long, apex truncate, sides arcuately narrowing to the basal constriction, disc convex, a slight median depression at base and a faint postapical constriction, surface coarsely punctured, the punctures rounded at the sides but less dense at middle. Elytra parallel, the apices truncate, sutural angle distinct, surface with coarse cribrate punctures somewhat in striæ, and short erect black hairs; color dull blue-black with three fasciæ, the anterior beginning with a broad base at the humerus extends inward leaving the base then turning abruptly parallel with the suture, a second fascia at middle, narrow, very slightly arcuate, the third fascia one-fourth from apex, slightly arcuate. Sides of metasternum and the posterior edges of segments 2–3–4 at sides with moderately long white hair. Abdomen quite smooth. Legs black with blue green surface lustre. Length, .38 inch; 9.5 mm.

This insect is allied to *illustris* Horn (Trans. Am. Ent. Soc., v, 1876, p. 231), and might even be an extreme form of that, but the uniform coloration of the specimens of *illustris* make it advisable to name the present form. In *illustris* the antennæ, except the last three joints, are rufo-testaceous, as are also the legs; the basal band keeps close to the margin and extends down the suture, the middle band decidedly arcuate and the posterior very oblique.

One specimen, El Chinche.

HYDNOCERA OMOGERA n. sp.

Form of *discoidea*, color black with a humeral yellow white spot (the umbone black), or with the white forming a transverse band immediately behind the umbone.

Antennæ entirely pale. Head moderately closely but not distinctly punctate. Thorax broader than long, sides strongly arcuate with a short apical and longer basal narrowing in the usual manner, surface scabrous. Elytra wider at base than the thorax, slightly narrowing to apex, margin serrate, apex very obtuse, surface shining coarsely punctured the punctures well separated except in a space one-third from apex where the punctures are fine, more crowded and with the pubescence, irregular forming a closer fascia. Body beneath black, feebly shining. Legs slightly variable, but the tendency is to have the anterior and middle legs pale, the posterior piceous. Length, .14 inch; 3.5 mm.

The species of Hydnocera are so variable in color and so difficult to describe sufficiently that it seems hardly proper to indicate new species in an isolated manner until the genus has undergone a systematic study. In a faunal list like the present essay there is a slight excuse for description. The species above named has the form and general appearance of *humeralis*, but with elytral punctures of *pallipennis*.

each side of the middle in front and also at base. Elytra densely finely punctulate, the pubescence forming a larger triangular area beginning at the humerus extending beyond the middle, the apex reaching the suture one-third from base, the scutellar area spotted with white, the apical third irregularly marmorate, the space at middle third almost nude. Body beneath black, densely punctulate and cinereo-pubescent. Length, .25 inch; 6.25 mm.

One specimen collected in western Nevada by Morrison; others by Schwarz at Brightons, Utah.

A prettily ornamented species and easily known thereby. Its most striking peculiarity is in the form of the antennæ. The normal form of antennæ in Xestobium is to have the last three joints triangular and larger than those which precede, the funicular joints slender. In the present species there are properly but three funicular joints, the third joint of the antennæ longer than the second or fourth, fourth shorter than second, fifth twice as long, narrowly triangular, sixth short, triangular, seventh similar to the fifth, eighth similar to the sixth, ninth and tenth like the seventh, eleventh a little longer. When the genera of Anobiini have been released from the confusion in which they appear to be at the present time this species may be separated from Xestobium, or, as the genus will then be called, Anobium.

CTENOBIUM CINEREUM n. sp.

Cylindrical, slightly depressed, piceous black, clothed with fine ashy pubescence nearly concealing the surface color. Head opaque rather coarsely punctured. Thorax one-third broader than long, sides arcuate, angles all rounded, disc convex with scarcely any irregularity, a faintly impressed median line, surface finely densely punctured. Elytra vaguely quadri-costate, the pubescence abraded from their summits, surface densely finely punctured. Body beneath as above. Length, .36 inch; 9 mm.

The specimen before me is probably a male, the last ventral is very obtuse with a shallow emargination extending from side to side.

Collected in southwestern Texas, near the Rio Grande.

TRICHODESMA SELLATA n. sp,

Cylindrical, rather more oblong than *gibbosa*, piceous black, densely clothed above with a white pubescence, dense, like a spider-web, a large saddle-shaped space common to both elytra of brownish pubescence. Antennæ ferruginous. Head densely pubescent. Thorax broader than long, sides arcuate in front, suddenly sinuately narrowing at the middle, hind angles distinct, disc strongly gibbous, an impressed line from the apical margin to the summit of the gibbosity, surface coarsely punctured, the pubescence forming denser reticulations, the summit of the gibbosity with short, stiff, brown hair. [redacted]

TRICHODESMA SORDIDA n. sp.

Cylindrical, oblong, more than twice as long as wide, black, head and thorax with dirty yellow pubescence, elytra with a band of same along the base, a very narrow sinuous band at middle and an irregular apical space of same color. Antennæ black. Head black, punctuation concealed. Thorax broader than long, sides arcuate in front, slightly sinuate in front of the hind angles, the latter distinct, disc gibbous behind the middle, a slight sulcus from the apical margin to the summit of the gibbosity, surface distinctly granulate and not densely clothed with dirty yellowish pubescence and with intermixed short, black erect hairs, but without brush at the summit of the gibbosity. Elytra but little wider than the thorax, the surface with irregular striæ of coarse, deep, not closely placed punctures and clothed with velvety black pile arranged in quite small spots, a dirty yellow band composed of spots across the base, a sinuous indistinct band at middle and a space near the apex of similar pubescence. Body beneath black, subopaque, surface granular dashed with recumbent, dirty yellow pubescence. Length, .30 inch; 7.5 mm.

This species is similar in form to *sellata*, being more than twice as long as broad, differing in having the sides of the thorax less sinuate behind the middle. It differs from all our species in having no brush-like tufts at the summit of the gibbosity of the thorax.

One specimen, Texas; special locality unknown.

TRICHODESMA CRISTATA Casey, Ann. N. Y. Acad., v, p. 323.

Form of *gibbosa*, but shorter and slightly more robust, piceous black, feebly shining, sides of thorax and base of elytra near the humeri densely clothed with web-like whitish pubescence. Antennæ brownish. Head piceous, sparsely granulate and clothed with ferruginous pubescence less abundant at middle. Thorax one-half wider than long, sides regularly arcuately narrowing to base without sinuation, the hind angles obliterated, disc gibbous at middle, surface rather closely granulate, densely clothed at sides with whitish web-like pubescence, the middle third nearly naked except the brushes of black hair at the summit of the gibbosity. Elytra wider than the thorax, with coarse punctures irregularly arranged in striæ with small patches of granules irregularly placed, more evident at base, surface indefinitely and sparsely clothed with short brownish pubescence with small whitish patches irregularly placed, small tufts of short erect hair form two series, the first of three patches beginning at the umbone extending obliquely backward to the suture, the second series one-third from apex, strongly arcuate on each elytron of four patches each side. Body beneath not densely granulate, clothed with short yellowish pubescence. Length, .24 inch; 6 mm.

This species is known by its form and the compara-

Form less than twice as long as wide; sides of thorax arcuately narrowing to base without sinuation; last three joints of antennæ together not longer than the preceding joints.
  Vestiture of surface rather dense and of whitish pubescence in great part. ***gibbosa.***
  Vestiture of elytra not dense, surface not concealed, a whitish border at base and a small white spot at declivity. ***cristata.***

The antennal character is to a certain extent sexual, the males having the last three joints longer than the females, but as used above (in a secondary position) the antennæ are in both sexes longer in the oblong group than in the shorter forms. The tooth of the claw is more acute in the shorter species.

The four species above recorded all belong to different faunal regions—*gibbosa* from the regions east of the Mississippi; *sordida*, Texas; *cristata*, from the California region; and *sellata*, from the Peninsula of California.

TRIPOPITYS TENUILINEATA n. sp.

Cylindrical, brown, subopaque. Antennæ pale, the basal joint piceous. Head moderately closely punctate, sparsely clothed with ochreous pubescence. Thorax broader than long, narrower in front, sides strongly arcuate, margin explanate, disc convex, a faint median impression and a feeble oblique impression each side reaching the base, surface roughly punctate but not densely and somewhat smoother in the impressions, surface sparsely ochreo-pubescent. Elytra moderately closely and irregularly punctate, indistinctly clothed with extremely fine ochreous pubescence which forms fine denser lines extending from the base nearly to the apex, a sutural line, one from the umbone, two between these on the disc, with an oblique scutellar line, a line external to the umbone. Body beneath paler than above, very finely densely punctured and with extremely fine pubescence. Length, .20 inch; 5 mm.

This insect looks far more like an Oligomerus than Tripopitys, but the serrate antennæ, the depressed mesosternum and the excavate metasternum have induced me to place it in the latter genus. The only characters in which it differs from that genus are the elytral sculpture and the more explanate sides of the thorax, in the latter respect resembling Ernobius. The specimen before me is a female, and the antennæ are equally serrate from the third to the tenth joints, eleventh longer. The elytral sculpture and ornamentation make it an easily recognized species.

Occurs in Oregon.

HEMIPTYCHUS ESTRIATUS n. sp.

Oblong, oval, piceous black, feebly shining, surface finely clothed with short indistinct pubescence. Head and thorax not visibly punctate. Elytra not visibly punctate except under microscopic power, the lateral striæ entirely obliterated. Body beneath not visibly punctate. Abdomen sparsely punctate, opaque, finely pubescent. Length, .18 inch; 4.5 mm.

This species is remarkable in its large size and almost

Scarcely longer than broad.	***latus.***
One-half longer than broad.	***estriatus.***

With *sectans* I have united *punctulata*. These were originally described from uniques, and the character based on size, which seems to be the only one separating them, has entirely disappeared in a series of twenty. The name *latus* is proposed for *obsoletus*, as there is at present a species with the latter name in Hemiptychus.

HEMIPTYCHUS ROBUSTUS n. sp.

Oblong oval, moderately densely clothed with ochreous pubescence which conceals the piceous color of the surface. Antennæ pale. Head minutely punctulate. Thorax minutely densely punctulate with coarse punctures widely scattered but closely placed near the hind angles. Elytra similarly punctulate, the slightly larger punctures more numerous and more evident near the apex, the marginal striæ deep, extending from the apex nearly to the middle. Body beneath similarly punctured to the upper surface, the coarser punctures of the abdomen more abundant and more evident. Length, .18 inch; 4.5 mm.

A number of specimens of this large species have been seen. At first glance they resemble *estriatus*, although more coarsely pubescent. It is at present the largest species known with the elytra striate at sides near the apex.

Southwestern Texas, near the Rio Grande.

The genus Hemiptychus threatens to be very troublesome. A number of species still exist without names, but it has not been thought advisable to name any but those necessary, in advance of any general revision of them.

CERACIS SIMILIS n. sp.

Cylindrical, castaneous, the elytra slightly darker at base, glabrous, distinctly punctate. Antennæ pale, the club darker. Thorax as broad at base as long, narrower in front in the ♀, surface finely not closely punctate, a smooth median line posteriorly. Elytra more coarsely punctate than the thorax. Body beneath sparsely punctate. Legs pale. Length, .05 inch; 1.25 mm.

Male.—Head smooth, concave, margin of clypeus reflexed and emarginate, apical edge of thorax at middle reflexed in a short lamina which is emarginate.

Female.—Front convex, sparsely minutely punctate, minutely alutaceous. Clypeus and margin of thorax not elevated.

This species is probably closely related to *quadricornis* Ghm., but the description is so brief as to render it unsafe to consider the two identical.

Coral de Piedra, Sierra el Taste.

RHIPIDANDRUS PENINSULARIS n. sp.

Cylindrical, brown, subopaque. Antennæ pale. Head reticulate, densely punctured between the eyes and pubescent, clypeus smooth. Thorax broader than long, slightly narrower in front, sides feebly arcuate, disc regularly convex, closely reticulate. Elytra not broader

In *paradoxus* the thorax is rather coarsely and densely punctured and the prosternum finely carinate; in *peninsularis* there is no carina.

Coral de Piedra, Sierra el Taste.

CANTHON OBLIQUUS n. sp.

Black, semi-opaque, oval narrowed behind as in *nigricornis*, surface not punctate nor granulate. Clypeus notched at middle not forming teeth, the sides oblique, scarcely perceptibly arcuate. Thorax smooth, disc convex with an ante-scutellar depression, a median impressed line from middle to base. Elytra arcuately narrowing almost from the humeri, the striæ almost entirely obliterated, surface very finely granulate-alutaceous. Pygidium flat, alutaceous. Body beneath extremely finely alutaceous. Length, .32–.38 inch; 8–9.5 mm.

In addition to the above, the following characters may be added that the relationship of the species may be traced in the tabular scheme given by Baron Harold (Berl. Ent. Zeit., 1868, p. 11). Posterior tibiæ slightly arcuate, with one spur, the femur not punctate nor with marginal line. Anterior tibiæ obliquely truncate. Prosternum beneath without transverse carina and without sub-marginal tooth. From these characters it would seem to be allied to *tristis*, which however has no thoracic depression. Among the Boreal American species it is probably best placed near *lævis*. It differs notably from any of our species in having the sides of the clypeus oblique and not arcuate. The male has the spur of the front tibiæ broader at tip, truncate and emarginate.

Occurs at Pescadero and Sierra el Chinche.

CHNAUNANTHUS PALMERI n. sp.

Similar in form to *discolor*, brownish tending to piceous, elytra, abdomen and legs yellowish. Head coarsely and deeply punctured. Apex of clypeus reflexed, acutely emarginate, the angles acute. Thorax coarsely sparsely punctate, smoother at sides and base. Elytra coarsely sparsely and irregularly punctate. Body beneath sparsely punctate and hairy. Length .14–.16 inch; 3.5–4 mm.

Male.—Anterior tibia without spur. Pygidium vertical or slightly inflexed, regularly convex, clothed with whitish hair.

Female.—Anterior tibia with spur. Pygidium oblique, rather deeply impressed each side near the apex, surface quite smooth.

Collected by Dr. Edw. Palmer at St. George, Utah.

The three species of Chnaunanthus may be separated in the following manner:

Surface quite shining. Clypeal teeth obtuse. Pygidium of female concave near apex. ***discolor.***

Surface dull. Clypeal teeth acute. Pygidium of female bi-impressed. ***Palmeri.***

Surface moderately shining. Clypeal teeth moderately acute. Pygidium of female with a single impression near the tip. Elytra bright yellow. ***flavipennis.***

ONCERUS CONVERGENS n. sp.

The differences between this species and *floralis* are almost generic and are as follows:

Sides of clypeus parallel; upper tooth of anterior tibia small; anterior claws simply cleft. *floralis*.

Sides of clypeus convergent; upper tooth of anterior tibia well developed; anterior tarsal claws dissimilar, the anterior one with a lobe-like tooth at base, both claws cleft at tip. *convergens*.

It is probable that all the specimens seen are males, as none of them have any anterior tibial spur and the pygidium is nearly vertical.

As classifications now stand, Oncerus is fairly well placed in the Chasmatopterides as defined by Lacordaire, but the same group as constituted in our fauna (Classification, p. 249) is not a natural one. Podolasia and Acoma should be separated by their simple claws.

Chnaunanthus has a distinct labrum concealed beneath the clypeus, while Oncerus has the labrum connate with clypeus, as in Phyllotocus and Cratoscelis more especially, as well as in Serica.

There seems to be a great need at the present time of a revision of the relationships of many genera at present placed vaguely among the Melolonthidæ.

Mr. H. W. Bates remarks (Biol., vol. 2, pt. 2, p. 129), in describing Aporolaus: "An interesting generic form * * * demonstrating that the mouth-structure (especially the free bilobed ligula) is more to be relied upon than the position of the abdominal spiracles as indications of natural affinity in this portion of the Lamellicorn series."

In emitting this opinion Mr. Bates seems to have been influenced by a reverence for the classification then existing. From my own studies, made necessary by my defense of the position of Pleocoma and by a critical examination of very many obscure genera of Lamellicorns, it seems clear that the free bilobed ligula and laparostict spiracles are concurrent characters.

There are at present a number of genera with a more or less membranous and free ligula associated with various tribes of Melolonthidæ, such as Phyllotocus, the Pachytrichides, Aclopides and Chasmatopterides, which might form groups between the Laparosticti and Pleurosticti, as at present arranged, and thereby render the transition less abrupt. The Pachycnemides occupy just such a position as placed by Lacordaire. The Chasmatopterides and Aclopides are true laparosticts, while Pachytrichia seems far better placed near Glaphyrus, as Hope, Burmeister and Westwood have suggested. Phyllotocus, a laparostict, is about as badly placed among the Sericides.

Some interesting results will follow a study of the Pachypodides. In Pachypus the spiracles are so placed as to make it doubtful whether they are truly laparostict or not. The entire organization of Pachypus seems to relate it to our Pleocoma, an undoubted laparostict, except as to the ligula. The larva of Pachypus is badly needed to settle its true position in the lamellicorn series.

Dichelonycha picea n. sp.

This species does not differ especially in form from the others. The clypeus is, however, more arcuate in front, the antennæ 8-jointed and the tibial teeth feebly indicated.

Two specimens, San José del Cabo and El Chinche 2,000 feet.

SERICA PILIFERA n. sp.

Oblong ovate, pale brown, dull, surface with semi-erect fulvous hairs. Head opaque, impunctate, clypeus coarsely punctate, more shining, the apical margin moderately reflexed with rounded angles, broadly but slightly emarginate, a very slight incisure each side. Thorax more than twice as wide as long, slightly narrower at apex, sides feebly arcuate, hind angles rectangular, surface dull, sparsely indistinctly punctate, margin fimbriate, disc with semi-erect fulvous hairs sparsely placed. Elytra very vaguely subsulcate, the intervals slightly convex, the sulci irregularly punctate, the punctures bearing a semi-erect hair. Body beneath dull, sparsely punctate and hairy. Length, .32 inch; 8 mm.

This species may be known by its hairy surface, the hairs of the elytra being vaguely arranged in rows in the sulci.

Santa Maria.

DIPLOTAXIS PUNCTULATA n. sp.

Oblong-oval, piceous black, moderately shining. Clypeus hemi-hexagonal, the angles well rounded, feebly emarginate, surface cribrately punctate. Head coarsely and densely punctate, a smooth vertical space. Thorax twice as wide at base as long, slightly narrowed in front, sides feebly arcuate, disc regularly convex, coarsely not closely punctate, intervals with few very minute punctures. Elytra with striæ in pairs of coarse punctures as in *tristis*, the intervals coarsely not closely punctate, the interspaces between the punctures finely punctulate. Pygidium coarsely closely punctate. Body beneath coarsely punctate, sparsely on the abdomen with a short yellow hair from each puncture. Length, .56–.60 inch; 14–15 mm.

The largest species of the genus known and of more robust facies than *tristis* and the allied forms, with which it should be associated. It differs from all of that group by the presence of the minute punctures of the elytra.

San José del Cabo, Coral de Piedra, Sierra El Taste.

LISTROCHELUS CARMINATOR n. sp.

Oblong, nearly parallel, rufo-castaneous, head and thorax darker and more shining, elytra dull faintly pruinose. Antennæ rufescent, club paler. Head coarsely closely punctured, clypeus hemi-hexagonal, feebly emarginate with rounded angles. Thorax less than twice as wide as long, slightly narrower in front, sides feebly arcuate margin crenulate and fimbriate, disc convex coarsely moderately closely punctate, more sparsely along the sides and base. Elytra more finely, less deeply punctured than the thorax, the costæ very indistinct. Body

Cremastochilus opaculus n. sp. Plate vii, fig. 1.

Oblong, black, opaque, dorsum very flat. Clypeus strongly carinate at middle. Disc of thorax sharply divided into three regions, anterior angles auriculate, the posterior spiniform, sides arcuate, sinuately narrowing to the hind angles, base sinuate within the angles, disc coarsely punctured, the outer lobes more coarsely and closely, the central portion more sparsely and more opaque. Elytra flat with punctures in the form of elongate scratches on the disc, but decidedly punctiform at the sides. Body beneath shining with coarse sparse punctures. Legs slender. Mentum entire. Length, .44 inch; 11 mm.

Closely allied to *spinifer*, but with the disc of thorax more sharply divided and differently sculptured. The hind angles of the thorax are not everted. It is also allied to *planipes*, but that has broad thin tibiæ.

Pescadero.

Eburia conspersa n. sp.

Pale piceo-testaceous, clothed with recumbent fulvous pubescence. Thorax transversely quadrate, sides feebly arcuate, with feeble post-median tuberosity, disc covered with callosities as follows: a median linear from apex to base, a broader one each side from base toward apex, a small oblique one between these in front, one near each front angle. Elytra rugulose, with scattered foveiform punctures, one ivory spot at base, two behind the middle, the outer longer, these spots on the line of nude costæ, the outer one nearly entire, the inner abbreviated, elytra at apex rounded, a sutural spine. Body beneath sparsely pubescent. Femora not spinose at apex. Length, .67 inch; 17 mm.

Quite unlike any of our other Eburia, more nearly resembling Elaphidion in habitus. The foveate punctures resemble a similar sculpture seen in *Brothylus gemmulatus*.

San José del Cabo.

ACYPHODERES DELICATUS n. sp.

Form slender. Head yellowish, cribrately punctate. Antennæ similar in color, half the length of body, stouter externally, scape coarsely punctate, third joint nearly as long as the next three. Thorax as broad as long, wider at middle, sides regularly arcuate, disc convex, densely punctate, very finely pubescent, a feeble median smoother line and vague oblique umbone either side, color reddish-brown, base and apex bordered with black. Scutellum flavo-pubescent. Elytra pale brownish testaceous, yellow-white along the base, form subulate, sparsely punctate and shining, although somewhat rugose near the base. Prothorax beneath black, densely punctate. Metathorax sparsely punctate and pubescent, with denser hair anteriorly. Mesopleuræ and apex of met-episternum densely flavo-pubescent. Abdomen pale piceo-testaceous, sparsely punctate and with few short hairs. Legs rufo-

SPHENOTHECUS BASALIS n. sp.

Piceous black, moderately shining, a very small hair in each puncture of dorsal surface, the basal region of the elytra and femora red. Vertex coarsely punctate at the sides. Thorax oval, narrower in front, apex and base truncate, sides arcuate, disc convex, a slight transverse depression in front of the base, surface with coarse transverse punctures not closely placed, the median line and depressed basal region smoother. Elytra coarsely irregularly punctate, the punctures becoming fewer and closer near the apex, apices acutely rounded, a small spine at the suture, a larger spine externally. Body beneath sparsely cinereo-pubescent. Legs black, femora red, the condyles of hind femora dentiform. Length, .48–.56 inch; 12–14 mm.

This species is congeneric with *S. suturalis*—in other words, is a Sphenothecus as restricted by LeConte. The genus, as admitted by Mr. Bates, is certainly a composite one. This species differs from *suturalis* in color and vestiture; the scutellum is nude.

San José del Cabo and Sierra El Chinche.

OPHISTOMIS VENTRALIS n. sp.

Slender. Head black, closely punctate. Thorax red or black, conical, longer than wide at base, apex constricted, sides compressed behind the middle, disc very convex, very sparsely and finely punctate, hind angles not explanate. Elytra wider at base than the thorax, humeri prominent, sides obliquely narrowing, apex obliquely emarginate-truncate, the angles acute, disc coarsely and deeply not regularly punctate, punctures finer toward apex. Pro- and mesosternum black. Metasternum and abdomen red, very sparsely finely punctate, not pubescent. Legs black, the under side of hind femora at base usually red. Length .42–.47 inch; 11–12 mm.

The vestiture of the upper side consists of very short black hairs arising from the punctures. This species is allied to *rufiventris* Bates from Nicaragua, but differs in its almost smooth thorax.

Ophistomis is barely separable from Leptura, the only character being the prolongation of the head into a beak.

Southern California. El Taste.

CŒNOPŒUS NIGER n. sp.

Form of *Palmeri*, black shining, the pubescence excessively fine, short, black. Antennæ black, joints three to seven, annulate with white. Front sparsely punctate. Thorax broader than long, angulate at the middle, sides in front oblique, behind the angulation forming a cylindrical constriction, surface with coarse punctures along the apex and base, very few at middle. Elytra coarsely, closely and deeply punctate, near the apex much smoother. Body beneath extremely finely pubescent. Length, .67–.75 inch; 17–19 mm.

This species differs from *Palmeri* in the coarser and closer elytral punctuation and by the absence of any ornamentation by pubescence either above or beneath.

third as long as first, fourth joint shorter, those following about equal in length. Eyes coarsely granulate, very deeply emarginate. Thorax strongly angulate at the sides. Scutellum not large, semicircular. Elytra wider at base than the thorax, apices entire, rounded. Mesosternum slightly convex.

This genus contains two species, of which *nudicornis* may be considered the typical form. The type is somewhat depressed, but less so than in Tapina, while the second species is slightly more convex. The coxæ are all widely separated, but to a less extent than in Tapina, and rather more widely in *nudicornis* than in the other. In the males of both species the anterior femur is slightly angulate on the under side one-third from the base, and with a small brush of short hairs. No such character has been seen in Tapina.

The relationships of this genus are as difficult to define as those of Tapina. It seems, while strongly related to Tapina, to connect that genus with the Estolides. Admitting the weight which Lacordaire insists should be allowed for the widely separated coxæ, especially the posterior, there can be no hesitancy in placing the genus near Tapina, a view also admitted by Bates by his considering *nudicornis* a possible Tapina. From the latter genus it will be separated by the antennæ not ciliate, and the similar form of the head in the two sexes. The two species are as follows:

Piceous black, moderately shining, muricate punctures of elytra irregularly placed. *nudicornis.*
Brown, dull, more convex, muricate punctures regularly and evenly placed. *fabra.*

PERITAPNIA NUDICORNIS Bates. (Tapeina?) Biol. Cent. Am., vol. v, p. 421.

PERITAPNIA FABRA n. sp.

Dull brown, clothed with short fine brownish pubescence, elytra with short erect black hairs arising from evenly disposed muricate punctures. Head finely and moderately closely punctate. Thorax much broader than long, sides strongly angulate at middle, in front of angulation the sides are oblique, behind sinuate, surface finely punctulate and pubescent with short erect hairs arising from sparsely placed coarser punctures. Elytra very minutely punctulate and finely pubescent with erect hairs arising from muricate punctures equally placed over the surface but not in striæ. Body beneath and legs paler, sparsely finely punctate and pubescent. Length, .37 inch; 9.5 mm.

The general form in outline is that of a Tapina, but more convex, approaching Tetraopes.

Occurs in Arizona, south of Tucson.

TETRAOPES ELEGANS n. sp.

Form of *discoideus*, black, elytra ornate with red, surface finely cinereo-pubescent, decidedly bluish on the very black spot, the posterior edge of the triangular spot bordered with black. Body beneath finely cinereo-pubescent. Legs black. Length, .35–.47 inch; 9–12 mm.

The coloration of the elytra is of a style similar to that of *discoideus*, but the black is more extended. It differs especially from that species in having the umbone more elevated and more sharply limited, and by the absence of the four black spots on the thorax which are so constant in our other species.

San José del Cabo.

LEMA FLAVIDA n. sp.

Form of *trilineata*, entirely yellow except the antennæ, tarsi, sutural interval and met-episterna, which are piceous black. Head with the usual v-shaped impression and small vertical fovea. Thorax constricted behind the middle, the dorsal transverse impression not deep, disc anteriorly with a few coarse punctures. Elytra with striæ of coarse punctures which become finer toward the apex, the intervals wider than the striæ and with a row of distant finer punctures, ninth striæ entire. Body beneath very sparsely punctate and slightly pubescent. Length, .24 inch; 6 mm.

This species resembles *trilineata*, and differs from it in the absence of the lateral elytral stripe and by the sutural stripe narrower.

San José del Cabo.

LEMA OMOGERA n. sp.

Shining black, elytra slightly blue with an orange spot at the middle of the base of each elytron extending narrowly around the humerus and down the side to the first ventral segment. Head with v-shaped impression without vertical puncture, occiput transversely paler. Thorax with but few scattered punctures, constricted behind the middle, the transverse dorsal impression feeble. Elytra with striæ of punctures becoming much finer toward the apex, the ninth entire, intervals broader than the punctures, smooth. Body beneath and legs black and shining. Length, .20–.24 inch; 5–6 mm.

Similar in form to *conjuncta* or *solani*, but easily known from all our species by the black head and thorax, with the basal orange spot on each elytron.

El Taste.

LEMA ÆMULA n. sp.

Form of *sexpunctata*, yellow or slightly orange, each elytron with three black spots and a short common sutural stripe near the base. Antennæ pale. Head with an acutely impressed v-shaped impression. Thorax smooth, constricted at middle, the dorsal transverse groove feeble. Elytra with striæ of coarse and deep, rather distant punctures becoming finer toward apex, the intervals smooth and convex at apex, the ninth striæ not extending more than one-third toward base. Body beneath pale, the sides of metasternum and tarsi darker. Length, .18–.20 inch; 4–5 mm.

Myocoryna peninsularis n. sp.

Head, thorax, body beneath and legs rufescent, elytra pale yellow, the suture, two discal vittæ and margin piceous. Antennæ pale, the outer five joints darker. Head coarsely irregularly punctate. Thorax sparsely, irregularly punctate, more coarsely and closely at the sides. Elytra with nine entire striæ of moderately coarse punctures not closely placed, a short scutellar striæ, the seventh striæ somewhat irregular, intervals smooth, color pale yellow with a sutural piceous vitta including two intervals which separate near the base, a vitta on the intervals between the third and fourth and between the fifth and sixth striæ, these united near apex, the outer stripe with an appendix at its base, marginal interval from humerus to apex piceous. Body beneath very sparsely punctate. Length, .29 inch; 7.5 mm.

This species is similar in form to *lineolata*, but with markings resembling *Zygogramma continua*. It has fewer discal vittæ than any of our vittate Myocoryna, except *Dalbomi*, where, with an almost black thorax, there is but one broad discal vittæ. The thorax is not spotted as in the *decemlineata* series.

Coral de Piedra, Sierra El Taste.

Epitrix flavotestacea n. sp.

Ovate, yellowish testaceous, very finely pubescent. Antennæ pale, the outer joints somewhat darker. Head smooth. Thorax moderately coarsely and closely punctate, the basal impression moderate, slightly sinuous. Elytra with striæ of moderate punctures, closely placed, intervals very slightly convex wider than the striæ, finely uniseriately punctate. Body beneath pale, usually with the metasternum and first ventral segment piceous. Length, .06–.08 inch; 1.5–2 mm.

This species resembles the Mexican *subcostata*, which, however, has the intervals subcostate. Its form and sculpture resemble our common *cucumeris*, but the color is different.

El Taste.

DYSPHENGES gen. nov.

Head oval, eyes free, front obtusely carinate between the antennæ without supra-antennal callosities. Labrum moderately large, feebly emarginate in front. Maxillary palpi moderately stout, the last joint slightly longer than the preceding, conical and acute at tip. Antennæ slightly longer than half the body, very slightly thicker toward the tip, first joint claviform, second half as long, third slightly longer than second, joints 4–10 slightly longer, eleventh longer, acute at tip. Thorax without basal or longitudinal impressions, the angles distinct. Scutellum triangular. Elytra a little wider than the thorax, with wide epipleuræ. Prosternum narrow between the coxæ, the cavities closed behind. Met-episterna much narrowed posteriorly. Ventral segments free, the first much longer than the second. Tibiæ grooved on the outer edge, each

(Trans. Am. Ent. Soc., xvi, 1889, p. 167), the Oxygonæ will take place near the Systenæ, from which they will be separated by the longer first ventral segment.

Doubtless the genus is allied to *Cyrsylus* Jacoby.

DYSPHENGES ELONGATULUS n. sp. Plate viii, fig. 8.

Form of an elongate *Longitarsus*, color variable from rufo-testaceous to piceous, moderately shining, glabrous. Head sparsely punctate, indistinctly alutaceous. Thorax a little wider than long, sides and base arcuate, apex truncate, the angles dentiform and setigerous, disc convex coarsely not closely punctate, punctures finer in front. Elytra wider than the thorax, slightly wider behind, apices truncate and rounded, disc convex, striato-punctate, the punctures closely placed, intervals flat and smooth. Epipleuræ coarsely irregularly punctate. Body beneath very sparsely punctate the abdomen transversely alutaceous. Length, .08–.10 inch; 2–2.5 mm.

No sexual differences have been observed in the specimens examined. One specimen is entirely piceous, excepting the knees, tarsi and base of the antennæ. The rufo-testaceous specimens have a piceous metasternum and abdomen.

El Taste.

LONGITARSUS BICOLOR n. sp.

Oblong, piceous black, shining, head and thorax rufescent, body apterous. Antennæ pale at base, darker externally, joints 2–3–4 about equal in length. Head smooth. Thorax broader than long, sides irregularly arcuate, disc moderately convex, sparsely indistinctly punctate, finely alutaceous, scutellum pale. Elytra oblong oval, humeri obliterated, punctate, not coarsely nor closely, surface shining. Body beneath piceous black, shining. Legs rufescent, posterior femora finely alutaceous. Length, .08 inch; 2 mm.

This species is the largest of our apterous forms, and differs from all known in our fauna by its color.

Margarita Island.

Bruchus Julianus n. sp.

Facies robust, approaching *scutellaris*, but otherwise very different, dark chestnut brown, with brownish pubescence variegated with ochreous above, ochreous beneath. Head coarsely punctate, a smooth carina between the eyes which are well separated. Antennæ piceous, the four basal joints pale. Thorax conical, broader at base than long, surface coarsely and moderately closely punctate, the intervals densely punctulate surface clothed at the sides with ochreous pubescence, the middle brownish. Elytra conjointly square with rounded corners, regularly striato-punctate, the punctures not coarse, intervals flat, closely punctulate, clothed with rather coarse brownish pubescence with whitish patches irregularly scattered, some ochreous spots at base and others in alternate intervals forming a much broken fascia at middle. Body be-

SPERMOPHAGUS (ZABROTES) SEMICINCTUS n. sp.

Quadrate-oval, robust, black, clothed beneath with cinereous pubescence, above black, variegated with cinereous. Antennæ feebly serrate, more than half the length of the body, black. Front feebly carinate. Thorax nearly semicircular with relatively coarse scattered punctures, the interspaces densely punctulate, clothed with black pubescence, at sides narrowly cinereous, in front of scutellum a long, narrow, triangular cinereous space branched in front, between the middle and sides three other cinereous spots, one of which joins the margin. Scutellum white. Elytra striate, striæ finely punctate, intervals flat, densely finely punctulate, clothed with black pubescence an irregular, narrow cinereous band at middle attaining the side but not the suture, a few dashes of cinereous on alternate intervals in front of and behind this band. Pygidium black with ochreo-cinereous pubescence along its anterior border and a conspicuous white line at middle. Length, .09 inch; 2.25 mm.

This species differs from all described in our fauna in the thoracic markings, and is evidently near to *pectoralis* of Mexico.

Dr. Sharp (Biol. Cent. Am., vol. v, p. 492) seems hardly willing to admit Zabrotes to full generic rank, but the feebly or not toothed claws, contiguous front coxæ, the shorter scutellum, together with the general facies, seem to entitle it to recognition. The question, however, still remains open whether *titivilitius*, the type of the genus Spermophagus, may not be the type of the Zabrotes group. In that case the latter will truly be a synonym and the other larger forms as *robiniæ*, etc., will have a new name.

San José del Cabo.

TRIMYTIS OBTUSA n. sp.

Oblong, piceous black, moderately glossy. Antennæ pale. Head densely and somewhat strigosely punctate, middle lobe of epistome obtusely triangular. Thorax about twice as wide at middle as long, sides regularly arcuate, base and apex nearly equal, the angles obtuse, moderately coarsely and closely punctate, somewhat strigose at the sides. Elytra slightly wider at base than the thorax, with striæ of fine punctures not closely placed, intervals irregularly biseriately punctate, the punctures of the striæ and intervals confused behind the scutellum. Pro- and mesosternum very coarsely punctured, the propleuræ strigose. Abdomen moderately coarsely not closely punctate. Legs slightly brownish. Length, .15—.18 inch; 4–4.5 mm.

Occurs at Sierra Laguna.

There are now three species of Trimytis known to me, which may be separated in the following manner:

Thorax distinctly wider at base than at apex, hind angles rectangular, anterior angles prominent to the front.

Middle lobe of epistome squarely truncate, front very little strigose at the sides; thoracic punctuation not coarse nor dense; surface mod-

EMMENASTRICHUS gen. nov.

This name is proposed for two species which are in all essential respects Emmenastus, except that the surface is sparsely clothed with hair more or less erect. This genus in its relation to Emmenastus parallels that of Pescennius to Trimytis, of which mention has already been made.

The two species known to me are—

Brownish, hairs moderately long; thorax with large round, closely placed punctures almost cribrate at the sides. ***cribratus.***

Piceous, hairs short; thorax with elongate punctures, denser and deeper at the sides. ***erosus.***

In both species the elytral epipleuræ are punctate, a character not observed in Emmenastus.

EMMENASTRICHUS CRIBRATUS n. sp.

Oblong, similar in form to *Emmen. punctatus*, brown or slightly piceous. Head with coarse, round punctures, close but not crowded, each bearing a short yellow hair. Thorax not quite twice as wide as long, slightly narrowed in front, sides feebly arcuate, anterior angles prominent in front, hind angles sharply rectangular, base slightly sinuate, surface with coarse, round, closely placed punctures at sides almost cribrate, each bearing a moderately long erect hair. Elytra oblong oval, with striæ of coarse closely placed punctures, intervals flat irregularly, biseriately finely punctate, all the punctures with an erect yellow hair longer than that of the thorax. Prothorax beneath very coarsely cribrate punctate. Meso- and metothorax similarly but less coarsely punctate. Abdomen coarsely not closely punctate, surface beneath sparsely hairy as above. Femora punctate. Legs sparsely hairy. Length, .32–.34 inch; 8–8.5 mm.

This species might readily be mistaken at first sight for an Amphidora; in fact, one was given to me as such.

San José del Cabo.

EMMENASTRICHUS EROSUS n. sp.

Moderately elongate as *Emmen. longulus*, piceous, dull. Head densely coarsely punctate, sparsely hairy. Thorax nearly twice as wide as long, apex slightly narrower, sides feebly arcuate, base almost squarely truncate, hind angles rectangular, apical angles prolonged to the front, disc sparsely hairy, coarsely and closely punctate, the punctures elongate and densely crowded at the sides. Elytra rather obtuse at apex, disc with striæ of moderately coarse and closely placed punctures, intervals flat, uniseriately punctate, the third and fourth biseriately, all the punctures bearing a short, semi-erect fulvous hair. Prothorax beneath coarsely punctate, the punctures of the pleuræ coarser than those of the sternum. Meso- and metasternum similarly punctate. Abdomen much less coarsely and less closely punctate. Body beneath inconspicuously hairy. Femora sparsely punctate. Length, .28 inch; 7 mm.

One specimen. San José del Cabo.

CENTRIOPTERA ANGULARIS n. sp. Plate vii, fig. 4.

Form more robust than usual in the genus, approaching

Legs coarsely closely punctate. Length from apex of thorax to tip of elytra, .83 inch; 21 mm.

While the absence of the head prevents a certain assignment of the species generically there seems to be but little doubt of the correctness of the assumption that it is a Centrioptera. It seems to go one step further from the general form of the genus than *infausta* toward *Cryptoglossa.* From all our species it differs in having the hind angles distinctly everted and the lateral margin in front of them slightly reflexed. These characters are faintly indicated in some *infausta.*

El Paraiso.

ASIDA PLANATA n. sp.

Of the exact form of *opaca*, black, subopaque. Head coarsely punctate. Thorax coarsely and closely punctate. Elytra slightly broader at base than the thorax, humeri distinct, the margin at that point slightly reflexed, disc transversely flat, the lateral marginal carina very nearly reaching the apex, surface even, without costæ or wrinkles, with sparsely placed small granules each bearing a minute hair. Prothorax beneath very coarsely punctured, granulate each side of the coxæ. Entire mesosternum and sides of metasternum granular. Abdomen finely sparsely punctate, last two segments more densely. Legs closely punctate. Length, .63 inch; 16 mm.

In the unique female before me there is a small fovea each side of the median line in front of the middle of the disc of the thorax. This is probably individual here as it is known to be in *morbillosa.*

This species may be known by its resemblance to *opaca* in form, differing in its almost sculptureless elytra which are flat in a transverse direction.

San Francisquito.

Asida planata belongs to a group of species which seems fairly definable. The elytra at base are wider than the thorax, the humeri rectangular or nearly so and the lateral margin is distinctly reflexed. In repose the hind angles of the thorax are slightly prolonged over the humeri. It will be also observed that the mentum does not completely fill the gular emargination and the ligula is nearly as distinctly visible as in Branchus. The species belonging to this group are moderately numerous. In the following table will be found the species of our fauna to which I have added two from Mexico, *collaris* and *scutellaris*, as a means of adding a good number of other forms from that region which belong near those cited:

Elytra sharply costate, the marginal ridge extending to the apex; hind angles of the thorax not everted.
  Elytral costæ regular, the outer one not joining the margin. *lirata.*
  Elytral costæ undulating, the outer joining the margin near the humerous. *scutellaris.*
Elytra not sharply costate.
  Marginal ridge of elytra entire, extending from base to apex; hind angles of thorax everted.
    Elytra with three lines of wrinkles replacing the costæ, disc transversely convex, more or less shining. *mancipata.*

granules each with a minute spine-like hair. Head moderately coarsely, not densely punctured. Thorax broader than long, slightly narrower in front, sides feebly arcuate with a slight sinuation posteriorly, the hind angles acute, disc moderately convex, a faint trace of a median groove, coarsely and closely punctured, denser at the sides. Elytra broadest behind the middle, humeri distinct but not rectangular, marginal ridge nearly reaching the apex, disc feebly convex transversely with three vittæ (one close to the suture) formed of minute granules each with a minute hair, a few scattered granules in the interspace next the margin, otherwise quite smooth. Prothorax beneath punctate at middle, granular at the sides. Meso- and sides of metasternum coarsely granular. Abdomen moderately finely not closely punctate bearing short hairs. Legs roughly punctured. Length, .70–.82 inch; 18–21 mm.

This species has no closely related form in our fauna, although not very different in outline from *moricoides* of Mexico. It will however be easily known by the feebly convex disc of elytra (rather less convex than in *opaca)* and by the replacement of the costæ by rows of minute setigerous granules.

Pescadero, west side.

ASIDA DENSICOLLIS n. sp. Plate vii, fig. 5.

Very like *carinata* or *bifurca* in general form, black, dull. Head densely punctured. Thorax trapezoidal, wider than long, widest one-third from apex, apex feebly emarginate, angles not prominent in front, sides arcuate in front, oblique behind, hind angles rectangular not prominent, disc rather strongly convex densely and rather roughly punctate, more roughened at sides and base. Elytra oval, broader behind the middle, one-half longer than wide, base as wide as the base of thorax, humeri oblique, marginal costa extending three-fourths to apex, disc convex with a well marked costa extending from base within the humerus more than two-thirds to apex, within this costa a much fainter one, nearly as long, slightly oblique to the suture, surface finely and moderately closely granulate. Prosternum coarsely closely punctate, propleuræ punctate-granulate. Mesosternum and metasternum granulate. Abdomen muricately punctate, more coarsely at the sides. Legs muricately punctate with short hairs. Length, .52 inch; 13 mm.

This species with the general outline and facies of *carinata* has the disc of the thorax convex and more roughly sculptured for its size than any species in our fauna. The inner costa of the elytral disc is very faint resembling a similar structure in *actuosa* where the costa may be entirely absent.

Two specimens. One in Mr. Wickham's cabinet from N. Yakima, Wash., the other in my own labelled doubtfully as from Oregon.

ASIDA IMPETRATA n. sp. Plate vii, fig. 4.

narrower than the thorax, humeri very obliquely rounded, lateral marginal ridge reaching nearly to the apex, disc moderately convex and with three costæ, the outer beginning at the lateral margin behind the humerus, extending near to apex and sinuous near its end, the second costa does not quite reach the base, is slightly oblique to the suture and indistinctly joins the outer costa near apex, inner costa faint joining the next outer one fourth from apex, these costæ and the lateral edge fimbriate at their summits with extremely short hairs, surface very finely and closely punctate. Pro-, meso- and metasterna coarsely not closely punctate. Abdomen rather closely and finely submuricately punctate with short yellow hairs. Legs roughly puuctate and slightly hairy. Length, .42–.56 inch; 10.5–14 mm.

This species must be placed near *parallelus* differing in its opaque surface, tricostate elytra and more narrowly reflexed sides of the thorax.

San Diego and Yuma, California. This species will doubtless occur in Baja California.

ASIDA EMBAPHIONIDES n. sp. Plate vii, fig. 8.

Form rather slender and graceful, dull brown suture and two lines on each elytron faintly paler. Head coarsely and closely punctate. Thorax more than half wider than long, slightly narrower between the basal than the apical angles, apex deeply emarginate, base bisinuate, sides regularly arcuate, disc flat, the margin broad and widely reflexed, the edge slightly crenulate and with short hairs, surface sparsely punctate, each puncture with a short hair. Elytra less than twice as long as wide, widest at middle, humeri very oblique, lateral margin sharp and slightly reflexed, marginal line suddenly incurved one-fourth from apex, thence oblique nearly to apex, disc nearly flat transversely, surface with sparsely placed erect spinules of peculiar structure. Prosternum sparsely punctate, with short erect hairs, propleuræ more coarsely punctate. Abdomen sparsely finely punctate, with short erect spinules. Legs roughly punctured with short hairs. Length, .60 inch; 15 mm.

This species is very peculiar in its form, having nothing in our fauna with which it may be compared. The widely reflexed thoracic margin, the flat and very acutely margined elytra suggest vaguely Embaphion or some species of Akis.

The spinules of the elytra and abdomen are of very peculiar construction. When examined under the high-power hand lense they are seen to be really feathers or spines pectinate on two edges, as in the tibial spurs of Prionochaeta and some other genera.

One specimen. San José del Cabo.

Asida Wickhami n. sp. Plate vii, fig. 7.

Exactly of the form of *parallela*, dull brown opaque, thorax less opaque. Head sparsely punctate, slightly hairy. Thorax about a third wider than long, widest slightly in front of middle, not wider at base than apex, erect hairs. Legs roughly punctured with short hairs. Length, .56 inch; 14 mm.

This species so closely resembles *parallela* that a specimen sent me by Mr. Wickham covered with the argillaceous coating so common in Asida was labeled *parallela*. It has exactly the same form and facies, but differs in its opaque surface and by the presence of a short additional costa branching from the marginal ridge.

Riverside, Arizona. Collected by Mr. H. F. Wickham.

Asida connivens Lec. A short time since, I stated that this species is the male of *bifurca*. In the present series it is shown that the only character of those mentioned by Le Conte for the separation of the two species of any value resides in the prominent hind angles. However, in a somewhat related species, *A. confluens*, the hind angles of the thorax are similarly prominent in the male, and to that extent confirm the view expressed.

A. horrida Champion, Biol. Cent. Am., iv, pt. 1, p. 500, pl. xxii, fig. 15, occurs in Texas near the lower Rio Grande, the Mexican locality being Nuevo Laredo, Tamaulipas. It is probably best placed in our series near *sexcostata*. The surface has short inconspicuous hairs, the side margin of thorax reflexed as in *hirsuta*, each elytron with two feeble discal costa parallel with the suture.

A. obliterata Champion, soc. cis., p. 493. This occurs in southern Arizona. At first glance this species would be placed near *marginata*, but the disc of thorax is scarcely convex and the lateral margin not reflexed, nor is there the median basal impression.

Eusattus secutus n. sp.

Very like *E. dubius*, but a little more convex, oblong oval, black, moderately shining. Head opaque, sparsely punctate, clypeus nearly entire. Thorax rather more than twice as wide as long, widest at base, sides arcuate, margin not fimbriate, hind angles acutely prolonged behind, disc convex, absolutely impunctate. Elytra smooth impunctate, without marginal edge. Epipleuræ gradually and but little wider at base, absolutely smooth. Prosternum coarsely punctured between the coxæ, the tip rounded and with a distinct marginal bead. Abdomen very sparsely and finely punctate, shining. Length, .37–.40 inch; 9–10 mm.

This species could not be mistaken for any other, except *dubius*, from which it differs in its smooth surface, nearly entire clypeus and margined prosternum.

El Taste and San José del Cabo.

EUSATTUS CILIATUS n. sp.

Oval, convex, black moderately shining, slightly more obtuse behind, margin of thorax and the legs ciliate with long yellowish hairs. Head sparsely finely punctate, clypeus deeply and broadly emarginate with a moderately deep incisure each side, the entire margin of the front reflexed. Thorax more than twice as wide as long, much narrowed in front, sides arcuate, the margin ex-

One specimen, Tantilles Mountains, Big Cañon, Baja California, lat. $\genfrac{}{}{0pt}{}{32}{33}$, long. 116.

The last table of the species of Eusattus appeared in Trans. Am. Ent. Soc., 1883, p. 304, and will now need correction for the new species added since.

Elytra with distinct lateral margin. 2
Elytra not margined. 5
2. Epipleuræ occupying the entire space below the margin; prosternum distinctly margined. *robustus.*
Epipleuræ narrow, suddenly broader at base. 3
3. Prosternum distinctly margined at tip; elytra subcostate. *costatus.*
Prosternum not margined at tip. 4
4. Elytra with faint costæ with intermediate reticulations. *reticulatus.*
Elytra coarsely irregularly eroded. *erosus.*
5. Prosternum margined at tip. 6
Prosternum not margined. 9
6. Elytra subopaque, punctured, with fine scale-like hairs. *puberulus.*
Elytra more or less shining, without hairs or scales. 7
7. Side margin of thorax explanate and ciliate; clypeus incised, on each side. *ciliatus.*
Side margin not explanate nor ciliate; clypeus not incised. 8
8. Prosternum broad, coarsely punctured between the coxæ; a distinct marginal line at the sides of thorax extending on the apex. *secutus.*
Prosternum narrow, smooth at tip; thorax without marginal line. *politus.*
9. Epipleuræ suddenly broader at base and smooth; tip of prosternum rounded and smooth. *lævis.*
Epipleuræ gradually broader toward base. 10
10. Epipleuræ smooth. 11
Epipleuræ punctate and hairy. 12
11. Form oblong, shining. *dubius.*
Form oval. *sculptus.*
12. Form oblong. *productus.*
Form oval, very convex. 13
13. Thorax either smooth or with minute scattered granules. *muricatus.*
Thorax distinctly punctate. *difficilis.*

E. sculptus Champ. includes *obliteratus* Ch. From types sent and additional material before me they prove to be variations parallel to those seen in *reticulatus.*

Specimens of the last four species are found in which there is shown a faint tendency to a margining of the prosternum.

ARGOPORIS EBENINA n. sp.

Black, somewhat dull. Head moderately finely and closely punctate, clypeus truncate. Thorax a little wider than long, narrower at base than apex, sides moderately arcuate, slightly sinuate near the hind angles which are rectangular, disc slightly flattened posteriorly, surface very finely and moderately closely punctate. Elytra oblong oval, widest slightly in front of middle, humeri slightly dentiform, disc slightly flattened, substriate with more distinct punctures in the male or with rows of fine punctures in the female, the seventh interval costiform at apex, joining an oblong tubercle on the first. Prosternum finely punctate, propleuræ granulate. Mesopleuræ cribrate, metapleuræ coarsely punctate. Abdomen finely punctate, wrinkled longitudinally. Legs black, finely sparsely punctate. Length, .55–.63 inch; 14–16 mm.

Male.—Anterior tibiæ serrate within, the inner apical angle prolonged inward. Posterior femora with a long

ARGOPORIS INCONSTANS n. sp.

Piceous black, rather dull, legs red. Head finely punc tate, clypeus truncate. Thorax a little wider than long, slightly narrowed at base, sides feebly arcuate, hind angles distinct, disc slightly flat, surface very finely sparsely punctulate, sometimes very indistinctly. Elytra oblong, widest at middle, humeri slightly prominent, surface variable in sculpture either subcostate as in *costipennis* or quite smooth as in *alutacea*. Prosternum beneath opaque, obsoletely punctate. Meso- and metapleuræ coarsely punctate. Abdomen finely punctate, longitudinally wrinkled. Length, .45–.53 inch; 11.5–13.5 mm.

Variations.—The extreme form has the elytra striate with moderately coarse punctures, intervals convex and near apex costiform. This form is known from San Diego and San Esteban.

The other extreme has the ordinary series of striate punctures, the intervals flat, not costiform at apex. San José del Cabo.

A specimen intermediate is known from San Francisquito.

Male.—Very like *ebenina*. The tubercle on the first ventral is triplicate.

Female.—As in *ebenina*.

There may be trouble in separating the extreme variations in the female—one form from *costipennis*, the other from *alutacea*—but in these latter the clypeus is always arcuate and not truncate.

San Diego, Cal. San Esteban, San Francisquito and San José del Cabo.

CERENOPUS ATERRIMUS n. sp. Plate vii, fig. 10, hind leg of male.

Form of *concolor*, but a little more slender, black, feebly shining. Head sparsely finely punctate, clypeus emarginate at middle. Thorax as wide as long, widest at anterior third, sides regularly arcuate, hind angles rectangular, disc convex, slightly flattened posteriorly, with extremely minute punctures sparsely placed. Elytra widest at middle, scarcely wider than the thorax, humeral angles dentiform, the extreme apices conjointly notched, surface with very faint traces of striæ or absolutely smooth. Prosternum transversely wrinkled, the pleuræ sparsely finely punctate. Meso- and meta-pleuræ coarsely granular. Abdomen sparsely finely punctate, first segment more or less plicate. Legs sparsely finely punctate, the tibiæ rough at apical half. Length, .86–.94 inch; 22–23.5 mm.

Male.—Anterior tibiæ serrate within, the inner angle prolonged. Posterior femora with a long, slender, slightly curved tooth one-third from apex.

Female.—Anterior tibiæ not serrate nor with the apical angle prolonged inward. Posterior femora simple.

This species is readily known by its very black color and almost sculptureless surface.

Santo Domingo del Taste and San José del Cabo.

coarse punctures or granules, the pleuræ sparsely granulate. Meso- and metapleuræ granulate. Legs sparsely punctulate, the tibiæ rougher at apical half. Length, .65 inch; 16.5 mm.

Male.—Anterior tibiæ serrate within, the inner apical angle prolonged, anterior femora very abruptly narrowed at base. Posterior femora with a moderately long, slender tooth one-third from apex.

Female.—Anterior tibiæ not serrate within the inner apical angle prolonged, the femur not abruptly narrowed at base; posterior femora simple.

In the male the first three ventral segments are slightly concave and smooth, the sides of the segments granulate-punctate. The female has the first three segments coarsely punctate from side to side, at middle slightly flattened.

In both sexes the last two ventrals are finely punctate.

The elytral sculpture of this species is of the same type as seen in *concolor* and shows a tendency to vary as in *Argoporis inconstans.*

Two specimens. San José del Cabo.

DOLIOPINES nov. gen.

Form oblong, parallel, depressed, body alate. Head dissimilar in the sexes, transverse male, oval female, the clypeal margin truncate male, arcuate female. Eyes transversely oval, coarsely granulate, deeply emarginate by the sides of the clypeus. Labrum transverse, feebly trilobed in front. Mandibles slightly visible beyond the labrum, apex bidentate. Mentum hexagonal with rounded angles, emarginate in front, partly membranous anteriorly. Ligula membranous, lanceolate. Labial palpi moderate in length last joint cylindrical as long as the two preceding joints, membranous at tip. Maxillary palpi longer, the second and fourth joints equal, third shorter, fourth joint slightly broader to tip, obliquely truncate, tip membranous. Antennæ arising under the sides of clypeus in front of the eye, more slender and two-thirds the length of body in male, shorter and more robust in the female; first joint conical, second small, third as long (female) or a little longer (male) than the first, joints 4–11 equal in length, slightly flattened, each two-thirds as long as the third joint. Thorax broader than long. Scutellum small, triangular. Elytra without explanate margin, epipleuræ terminating abruptly near the apex. Prosternum not wide between the coxæ, coxal cavities round not angulate externally. Middle coxal cavities slightly open externally with a feeble trochantin. Intercoxal process of abdomen acutely triangular. Anterior tarsi with joints 1–4 small, together scarcely longer than the fifth, middle tarsi first joint as long as next two, hind tarsi first joint longer than next two and as long as the fourth. Vestiture of tarsi consists of stiff hairs. Abdomen as in Doliema.

In the above description as many details are given as possible that the close relationship with Doliema may be realized. The only valid difference is in the form of the parallel, obtuse at apex with a slight sinuation caused by the abrupt termination of the feeble lateral edge, disc flat at middle, at sides rounded without sub-marginal edge, surface finely striate, striæ finely, moderately closely punctate, intervals flat minutely punctulate. Body beneath finely not closely punctate. Length, .23–.32 inch; 6–8 mm.

San José del Cabo.

NOTIBIUS REFLEXUS n. sp.

Form nearly of *N. opacus*, velvety black. Head moderately closely punctate, finer on the clypeus, the latter moderately deeply emarginate. Thorax broader than long, widest a little in front of middle, base slightly narrower than apex, sides arcuate, hind angles rectangular. Elytra slightly oblong or regularly oval, wider than the thorax, the entire lateral margin visible from above and slightly reflexed near the humeri, disc convex, very finely striate, striæ finely and closely punctate, intervals flat, slightly convex near the apex, very finely punctulate. Prosternum punctate-granulate, propleuræ strigose. Meso- and metasternum coarsely punctate. Abdomen finely punctate. Legs black, finely submuricately punctate. Length, .15–.20 inch; 4–5 mm.

The anterior tibiæ are merely slightly broader from base to apex and similar in the two sexes. The male has the first two ventral segments slightly flatter at middle.

This is the only species known to me in which the entire lateral margin of the elytra is visible from above and slightly reflexed near the base.

Occurs at San José del Cabo.

NOTIBIUS COSTIPENNIS n. sp.

Similar in form to *N. opacus*, black, opaque. Head roughly punctured between the eyes, clypeus smoother, broadly emarginate. Thorax broader than long, widest in front of middle, sides arcuate, hind angles distinct, disc moderately convex, punctuation dense and somewhat strigose longitudinally, surface very opaque. Elytra a little wider than the prothorax, disc convex, deeply sulcate, with a row of coarse ill-defined punctures, intervals acutely costiform. Prosternum coarsely not deeply punctured, propleuræ longitudinally strigose. Metasternum at sides coarsely punctate. Abdomen sparsely punctate and more shining. Legs black, alutaceous, not closely submuricately punctate. Length, .22 inch; 5.5 mm.

Of this species I have seen but two somewhat mutilated specimens, which show no evidence of sexual difference. It resembles *sulcatus*, but differs from that in having the thorax distinctly narrower behind, as in *opacus*, and by the acute elytral intervals.

Magdalena Island and Lower Purisima.

Notibius is used in the same sense as in the Class. Col.

distinctly longer than the first. Front flat or slightly concave, moderately coarsely and closely punctate. Thorax nearly twice as wide as long, widest at middle, apex truncate, angles not prominent, sides arcuate, the margin acute, base truncate with obtuse angles, disc moderately convex, a crescentic depression near the base, moderately coarsely and closely punctate. Elytra oval, slightly prolonged at apex, convex, moderately deeply striate, striæ coarsely not closely punctate near base, gradually more finely toward apex where the punctures disappear, intervals convex, smooth. Prothorax beneath at middle and sides more coarsely punctured than above. Meso- and metasternum less coarsely punctured. Abdomen more sparsely and gradually more finely punctate toward the apex. Body apterous. Length, .26 inch; 6.5 mm.

The form of this species is more nearly that of *æreus*, although more robust, while the rather deeply striate elytra suggest *farctus*.

The name Helops is used in the sense intended by Lacordaire. The numerous genera into which it has been divided are not only difficult of appreciation, but so indefinite that disagreement with the position of species is expressed by about every one who has followed Allard.

One specimen. Coral de Piedra, Sierra El Taste.

PHEDIUS OPACULUS n. sp.

Dull black, opaque, form very like *carbonarius*. Antennæ black or brownish. Head punctate, not coarsely, somewhat more closely in the male. Thorax one-fourth wider than long, slightly narrower at apex than base, sides feebly arcuate, base feebly arcuate, hind angles obtuse, disc convex, sparsely punctate. Elytra oval, convex, slightly wider at base than the thorax, disc with striæ of faint punctures sometimes nearly obliterated, intervals flat, not punctate, the surface microscopically alutaceous. Body beneath very sparsely punctate. Abdomen smooth. Legs finely sparsely punctate. Length, .36–.40 inch; 9–10 mm.

At first sight this insect would be thought a Helops allied to *difficilis* or *spretus*. The figure given by Mr. Champion (Biol., iv, pt. 1, pl. xx, fig. 19) very closely resembles our species, excepting the pilose surface of *carbonarius*. It is, however, more closely related to *hidalgoensis*, which, however, has the interstices finely and sparsely punctured.

Sierra Laguna, El Taste and Pescadero.

ALLECULA SORDIDA n. sp.

Brownish black, dull, sparsely clothed with short black erect hair. Head coarsely and moderately closely punctate. Thorax about one-fourth wider than long, narrower in front, sides arcuate in front then parallel to base, hind angles rather obtuse, disc convex, a slight median impression near the base, basal foveæ small, surface densely and moderately coarsely punctate. Elytra with striæ of moderate size, closely placed punctures, the striæ slightly

LYSTRONYCHUS CHAMPIONI n. sp.

Entirely black, sub-opaque. Head densely and relatively coarsely punctured. Thorax more than half wider than long, sides strongly arcuate from the front angles to middle where there are two distinct teeth, thence narrowing to base, disc regularly convex, very densely punctured. Elytra broader than the thorax, slightly wider behind the middle, disc with striæ of very closely placed punctures, the intervals flat with a single row of punctures, some of which are much larger and bear a short, erect, stiff black hair, submarginal stria quite deeply impressed. Prosternum coarsely sparsely punctate, the pleuræ densely punctate. Meso-metasternum coarsely punctate. Abdomen shining much more finely and sparsely punctate. Legs black, punctate. Length, .28 inch; 7 mm.

A slightly larger and more convex species than *scapularis* with less opaque surface, which has a faint bluish tinge. The humeral red spot in the Mexican species being a constant character affords an additional means of distinction. The above described species with *scapularis* and *denticollis* agree in having the sides of the thorax bidentate.

I dedicate the species to Mr. Champion, who has given us in his treatment of the genera of Mexico the correct elements for proper classification of the family.

One female, western Texas.

The two species now known in our fauna are as follows:

Antennæ slender, outer joints not flattened; thorax scarcely wider than long, the sides not dentate. *piliferus.*
Antennæ broader externally, the joints subserrate; thorax broader than long, sides bidentate at middle. *Championi.*

Both species occur in Texas, the former extending as far as Brazil.

HYMENORUS PLANULUS n. sp.

Oblong, parallel, similar in form to *occidentalis* but much more depressed, piceous, semi-opaque, antennæ and legs ferruginous. Antennæ not longer than half the body, third joint longer than fourth. Head coarsely not closely punctate, clypeus more densely, eyes large, narrowly separated. Thorax one-half wider than long, sides arcuate in front nearly parallel in basal half, hind angles sharply rectangular, disc slightly convex, coarsely densely punctured (as in *occidentalis*). Scutellum densely punctured. Elytra a little wider than the thorax, sides nearly parallel, gradually narrowing at apical third, the sutural angle obtuse, disc flat finely striate, striæ closely finely punctate, intervals flat, moderately closely punctate and with short brown hair. Prosternum densely punctate, propleuræ quite smooth near the margin. Abdomen shining, sparsely finely punctate. First joint of hind tarsus longer than the following joints. Length, .30 inch; 7.5 mm.

One female specimen evidently related to *occidentalis* from the table given by Capt. Casey (Ann. N. Y. Acad., [redacted] arcuate anteriorly, hind angles rectangular, disc moderately convex, coarsely and closely punctate. Elytra more than twice as long as wide, sides parallel, arcuately narrowing at apical third, the apex slightly sinuate near the suture, the sutural angle prolonged into a spine, disc slightly flattened, finely striate, striæ finely punctured, intervals flat, submuricately punctulate, but not densely. Prothorax beneath densely punctured and opaque, the propleuræ near the margin much smoother. Abdomen shining, sparsely finely punctate. First joint of hind tarsus longer than the following joints. Length, .37–.48 inch; 9.5–12 mm.

This species is described with the view of introducing an element in Hymenorus hitherto unrecorded—the spiniform prolongation of the sutural angle. I have, in addition, a second species closely resembling *occidentalis* superficially, with the sutural angle acute, but never with the spine so well developed as in *spinifer*. The species now described is related to *occidentalis* and is the largest species known in the genus.

Mr. Champion has recorded the spiniform suture in several species of Lobopoda, and, from the yet unstudied material in my cabinet, the line of demarcation between that genus and Hymenorus is becoming gradually effaced.

Four specimens. Southern Arizona.

SISENES CHAMPIONI n. sp.

Elongate, nearly parallel male, broader behind female, head and thorax black shining, with a slight tinge of blue, elytra entirely orange-yellow with similar pubescence. Antennæ black, slender in both sexes, third joint shorter than the fourth. Head elongate, sparsely, finely and indistinctly punctate. Thorax one-fourth longer than wide, widest one-third from apex, sides anteriorly slightly arcuate, posteriorly feebly sinuate, disc feebly convex a vague triangular flattening from the apex toward base, finely, sparsely punctate a broad vitta of fulvous hairs each side, black along the middle. Scutellum black. Elytra nearly twice as wide as the base of the thorax, disc faintly tricostate, one costa on the deflexed sides the other two superior within the humerus, surface densely finely punctate, clothed with short fulvous hairs. Body beneath and legs deep blue-black, shining. Abdomen sparsely punctate. Length, .36–.40 inch; 9–10 mm.

The male has the last ventral segment deeply emarginate, in the female it is simply truncate. This species belongs to Champion's group 1–a characterized by filiform antennæ in both sexes, and with the first four joints of the front and middle tarsi and the third of the hind tarsi tomentose beneath.

From the figures given by Mr. Champion of many of his species there is no indication of as elongate a head as the present species. In fact, the head is nearly as elongate as in Rhinoplatia.

Collected in southern Arizona (Morrison).

MACROBASIS TENUILINEATA n. sp.

Male.—First joint of antennæ not difformed, shorter than second, this somewhat thickened and nearly as long as the next three. Anterior tibiæ with two spurs.

Female.—Second joint of antennæ not thickened and not longer than the first.

The first two joints of the female antennæ are conspicuously cinereo-pubescent, in the male nearly glabrous. In all the females before me there is a piceous spot each side of the scutellum and in front of the humeral umbone, not seen in the male.

This species may be associated with *tenuis* and *unicolor* in the arrangement suggested by me some years ago (Proc. Am. Philos. Soc., 1873, p. 89).

Sonora, Mexico and San José del Cabo.

CALOSPASTA DECOLORATA n. sp.

Form rather short, deep violet, the elytra entirely reddish-yellow (male), or with an oval piceous spot on the middle of suture. Antennæ short, compact. Head broadly oval, occiput truncate, surface coarsely irregularly punctate. Thorax quadrate, broader than long, narrowed for a short distance in front, disc feebly convex without median impressed line, surface nearly smooth with very indistinct scattered punctures (male), or with coarse irregularly placed punctures (female). Elytra much wider at base than the thorax sides parallel (male), or slightly divergent (female), surface coarsely scabrous with two feeble costæ on the disc near the suture. Body beneath deep blue, sparsely silken pubescent. Legs blue, sparsely hairy. Length, .30–.36 inch; 7.5–9 mm.

In the male the last ventral segment has a small acute notch, in the female truncate. The upper surface from indications is sparsely clothed with short silken pubescence. The spurs of all the tibiæ are slender and similar.

From its broad thorax and other characters this species should be placed near *Fulleri*, from which it differs radically in color.

Calmalli Mines.

It is highly probable that Mr. Champion has realized the extremely close relationship existing between Calospasta, Tegrodera and Eupompha, and but few more species are needed to unite the three beyond question. Recently (Ann. N. Y. Acad., 1891, p. 175) Capt. Casey has described the genus Negalius, which does not show any structural differences from Calospasta, the grooved mandibles and dilated tarsi occurring in the latter genus.

The most remarkable discovery, however, is the result of the collections of Mr. D. W. Coquillett of Los Angeles. During a visit to him in May, 1893, he gave me what I recognized as a Calospasta. The male has the form of *Fulleri* (which is rather that of a Tetraonyx than a Calospasta), but the female is from any standpoint of classification a Meloide, apterous and with the meso-coxæ overlapping the metasternum. In fact, the female was described by me many years ago as *Megetra opaca*.

As *opaca* must now be placed in Calospasta, it can be separated from *Fulleri* in the following manner:

Thorax moderately shining with scattered coarse punctures; elytra entirely covering the body in both sexes which are winged. *Fulleri*.

Thorax opaque comparatively smooth and impunctate; elytra covering the body in the male, body winged, elytra much abbreviated and divergent from the scutellum, body opterous in the female. *opaca*.

From the study thus briefly made the further conclusion suggests itself that the tribe Meloini, based as it is on apterous forms and the consequently short metasternum, is unnatural, and that the genera composing it should form part of other tribes. Thus Meloe would associate with Cantharis, Henous with Epicauta, the two species of Nomaspis divide—one toward Cantharis, the other to Epicauta. Megetra and Poreospasta ally with Calospasta, Tegrodera et al. Cysteodemus seems unrelated. We have already in Hornia an apterous Sitaride, although Mr. Champion has allowed himself to be misled by the prevailing methods of classification, and has formed for it a tribe apart.

PYROTA TROCHANTERICA n. sp.

Elongate, black, feebly shining, head and thorax in part yellow, elytra with the suture, margin and apex narrowly yellow and an arcuately oblique yellow vitta each side of the scutellum. Antennæ black, slender, setaceous. Head elongate oval, very sparsely punctate, occiput black, front yellow with a central piceous spot and four smaller ones anteriorly in an arcuate row. Labrum black, coarsely punctate. Thorax much longer than wide, sides parallel behind, obliquely narrowing in front, disc rather flat, smooth, a few punctures at the sides, color in great part black, in front yellow to a variable extent. Scutellum black. Elytra moderately closely punctulate and vaguely tricostate. Body beneath black.

Trochanters conspicuously yellow. Legs black, the basal half of the middle and hind tibiæ yellow. Length, .36–.64 inch; 9–16 mm.

Male.—Last joint of maxillary palpus transverse, narrowly oval, inner angle acute, the under side concave. Fifth ventral segment triangularly impressed at apex, sixth deeply and broadly emarginate.

Female. — Last joint of palpus cylindrical, slightly broader at middle, apex truncate. Last ventral segment with a small triangular notch.

This species resembles *insulata* Lec., but the elytra have not the apical yellow spot. The legs, including the trochanters, are entirely black in *insulata*. The elytral coloration resembles the figure of *divirgata* var. (Biol., iv, pt. ii, pl. 21, fig. 17), but the color of the trochanters is not noticed in the descriptions, and if conspicuously pale, as in *trochantericus*, would certainly have been.

Sierra El Chinche 2,000 feet.

TETRAONYX DUBIOSUS n. sp.

Rufous, clothed with very fine short pubescence, opaque lated to *decipiens*, but Haag makes no mention of the ventral spots, and the tibiæ are in that entirely black. In our species the thorax is closely and regularly punctate; in *decipiens* it is irregular and in groups.

One specimen. El Chinche, San Julio.

EPICÆRUS LUCANUS n. sp.

Pyriform, moderately robust, elytra densely clothed with cinereous and ochreous scales forming an illy defined pattern of three oblique fasciæ on each side, the inflexed portion of sides much whiter. Rostrum quadrangular, parallel, flat above, a fine median groove ending in a fovæ between the eyes, lateral sulci wanting or indicated by a vague fovea, surface above coarsely sparsely punctate and sparsely scaly, beneath densely scaly. Thorax conical with slightly arcuate sides, the base a fourth wider than long, disc convex, the median line with a fine groove interrupted at middle, surface with coarse scattered punctures, the interspaces finely punctate, scaly vestiture not dense; under side of prothorax very densely scaly. Elytra regularly oval, not compressed at apex, with striæ of coarse deep punctures, intervals (when abraded) very finely punctulate, scaly vestiture dense with very short erect hairs irregularly placed. Body beneath very densely scaly. Middle and posterior femora conspicuously more densely scaly at apex. Length (apex of thorax to tip of elytra), .32–.58 inch; 8–14.5 mm.

This species is given a name not without some misgivings that it may be one of the forms described from Mexico, but the descriptions of some of the more recently described species from that region are annoyingly short and unsatisfactory. As compared with our Boreal American species it is far more robust than *imbricatus*, approachng the form of *formidolosus*, but differs from either species by the absence of the lateral sulci of the rostrum.

Sierra El Chinche, Pescadero and San José del Cabo.

RHIGOPSIS SIMPLEX n. sp.

General form of *R. effracta* and recalling the facies of some *macrops*, clothed with dirty white, broadly oval thin scales, the middle and sides of thorax darker and with series of darker spots on the elytra. Beak with fine median sulcus extending from apex to occiput, lateral sulci scarcely evident. Thorax broader than long, widest near apex sides straight and slightly convergent behind, a slight post-apical constriction, disc very coarsely and deeply punctured, a vague median depression. Elytra regularly oval, disc convex the suture and two discal costæ feebly elevated without tuberosities, the intervals with striæ of coarse punctures almost entirely concealed by the broad leaf-like scales. Body beneath with brownish-white scales. Length, .18 inch; 4.5 mm.

As in *effracta* the surface has short, semi-erect curved hairs, sometimes concealed by the surface exudation. This species may be known from *effracta* by the absence whiter scales predominant and with moderately long and slender cinereous hairs over the entire surface. Head very sparsely coarsely punctate. Thorax nearly a half wider than long, broadest at middle, sides regularly arcuate, a feeble post-apical constriction, surface very indistinctly coarsely punctate. Elytra oval, the sides parallel for a short distance, humeri rounded, disc finely punctato-striate, intervals flat, irregularly biseriately punctate, each puncture with an erect hair. Body beneath with paler, less dense scales and with shorter hairs. Legs moderately densely scaly and with long hairs. Length, .20 inch; 5 mm.

I place this very inconspicuous insect in Geodercodes, from the fact that the second ventral segment is longer than the next two and the front tibiæ are not serrulate within. It has the general form of Geoderces but less robust. The moderately long hairs is a character universal in this part of the Otiorhynchide series.

One specimen. San Jorge.

THRICOLEPIS? SEMINUDA n. sp.

Form elongate, resembling in facies a diminutive *Peritaxia rugicollis*, sparsely clothed with easily removable scales and with an irregular row of short whitish hairs on each interval. Beak longer than the head, longitudinally plicate, eyes surrounded by a groove, scrobes terminal, vague. Scape of antennæ passing slightly the apex of thorax, shorter than the funiculus, the first two joints of which are moderately long and equal. Thorax wider than long, sides regularly arcuate, a feeble post-apical constriction, disc convex, coarsely deeply and closely punctate. Elytra oblong-oval, nearly twice as long as wide, with regular rows of moderately coarse and closely placed punctures, the intervals flat and more than twice as wide as the striæ, the scales narrow, semi-erect and deciduous. Abdomen sparsely punctate, the first segment transversely wrinkled. Legs paler, sparsely hairy. Length, .16 inch; 4 mm.

This species may be compared in facies to a small *Peritaxia rugicollis*, and almost equally to an elongate *Exomias pellucidus*. I place it in *Thricolepis* temporarily to avoid the necessity of erecting a genus for each new species. Unfortunately, the Le Conte system of classification of the Curculionidæ, as a whole, is so radically different from that of Lacordaire that it is impossible to correlate the genera, especially of the Otiorhynchidæ, without actual comparison; and the more genera established on unique species and specimens, the greater will be the confusion in the future.

Two specimens. San Julio.

SCYTHROPUS DELICATULUS n. sp.

Form rather slender, densely clothed with pale green, oval, pearly scales. Antennæ pale testaceous. Head with few short erect hairs, especially on the beak. Thorax very little wider than long, sides very feebly arcuate. Elytra widest behind the middle, disc finely than wide to slightly wider than long, slightly wider at base than apex, sides feebly arcuate. Elytra oblong-oval, nearly twice as long as wide, base equaling the base of the thorax, disc finely striate, striæ finely closely punctate, intervals feebly convex. Body beneath less densely clothed than above. Legs scaly. Length, .14–.19 inch; 3.5–4.75 mm.

This species varies to such an extent that with a few selected specimens it might be divided into three species. The first variety has on each elytron behind the base an oval brown-black spot variable in size, at the declivity a crescentic fascia of similar color, and near the apex an oval spot.

In this form the cinereous scales of the surface have numerous brown ones intermixed.

In the second form the sub-basal spots are small, the crescentic fascia is reduced to a small spot on each side and the apical spot is minute.

The third variety has the spots so small that they might be mistaken for accidental abrasions.

Specimens are before me with the post-basal spots alone present, others again with these absent and the two posterior spots present and very small.

Coral de Piedra, Sierra El Chinche and San José del Cabo.

POLYDROSUS PENINSULARIS n. sp.

Form nearly of *dorsalis*, clothed with cinereous scales, the elytra with a sinuous fascia of darker color at the declivity, variable in width and color. Antennæ pale, the club darker, scape joint longer than the hind margin of the eye. Head with some blackish scales. Thorax not longer than wide, slightly narrower in front, sides very feebly arcuate, disc covered with intermixed darker scales. Scutellum longer than wide. Elytra much wider at base than the base of the thorax, a little wider behind the middle, humeri moderately prominent, disc convex, with fine striæ, striæ not densely punctured, intervals flat, with a row of extremely short setæ. Body beneath scaly as above. Legs pale brown, with scales and hairs. Femora not dentate, tibiæ not sulcate. Length, .08–.12 inch; 2–3 mm.

The specimens examined vary in the distinctness of the sinuous elytral band, in one specimen scarcely discernible.

This species is a true Polydrosus, and from the structure of the antennæ and their scrobes is related to the European *tereticollis.*

With Polydrosus the genus Cyphomimus is synonymous, as indicated by Bedel (Coleop. du Bassin de la Seine, vi, p. 57, note). The species described by me as *C. dorsalis* is probably the same as *Polydrosus americanus* Gyll.

Coral de Piedra, El Taste, San José del Cabo.

Copturus quadridens n. sp.

middle an arcuate row of four tubercles on each, convex anteriorly, tipped with fuscous scales, a tubercle on each elytron before the apex, surface with striæ of coarse punctures almost entirely concealed by the scales, vestiture of white and brown scales intermixed. Body beneath uniformly clothed with dirty white scales, the legs with intermixed scales. Femora not toothed. Second ventral segment quadrituberculate along its posterior border. Length, .14 inch; 3.5 mm.

Among the species at present known in our fauna this one is related to *mammillatus*, but it differs strikingly from all by the pronounced tuberosities of the thorax and elytra.

One specimen. El Taste.

BARIS PENINSULÆ n. sp.

Oblong-oval, form and general appearance of *subænea*, black, shining, a slight æneous surface lustre. Beak stout, closely and relatively coarsely punctate, head almost smooth. Thorax as wide at base as long, slightly narrowed in front, disc convex, coarsely and closely punctate with an incomplete smooth median line, each puncture with a narrow white scale. Elytra slightly narrowed behind, about one-fourth longer than the thorax, deeply striate, intervals flat, the third a little wider and confusedly biseriately punctate, the other intervals irregularly uniseriately punctate, each puncture with an elongate white scale. Pygidium coarsely and densely punctured. Body beneath coarsely and closely punctate, less so on the abdomen, each puncture with an elongate white scale. Prosternum not as wide between the coxæ as the width of one of the coxæ. Tibiæ straight, without external dentiform process. Length, .15 inch; 4 mm., nearly.

Of this species four specimens have been examined. It seems to be related to *aprica* Casey. The genus Baris, as accepted by LeConte, has been subdivided by Capt. Casey, one of the important characters being the separation of the anterior coxæ, whether narrowly or widely. I have not been able to realize the importance of this character, as the transition is so gradual that the position of a species becomes purely opinionative and controlled by facies.

San José del Cabo.

ANTHRIBUS VAGUS n. sp.

Cylindrical, moderately densely clothed with intermixed whitish and ochreous scale-like hairs, the paler scales more numerous in an indefinite region behind the base of the elytra. Head and beak marmorate with ochreous and white scales. Thorax slightly wider at base than long, narrower in front, sides arcuate, disc convex coarsely punctate, with three erect tufts of brown scales forming an arcuate row at middle, surface marmorate with ochreous and whitish scales, an arcuate line each side of middle semi-nude. Elytral sculpture almost concealed by

EXPLANATION OF PLATES.

PLATE VII.

Fig. 1. *Cremastochilus opaculus* Horn.
Fig. 2. *Acmæodera stigmata* Horn.
Fig. 3. *Acmæodera clausa* Horn.
Fig. 4. *Centrioptera angularis* Horn.
Fig. 5. *Asida densicollis* Horn.
Fig. 6. *Asida impetrata* Horn.
Fig. 7. *Asida Wickhami* Horn.
Fig. 8. *Asida embaphionides* Horn.
Fig. 9. Head of *Cerenopus angustatus* Horn.
Fig. 10. Hind leg of male of *Cerenopus aterrimus* Horn.
Fig. 11. *Doliopines cucujinus* Horn.
Fig. 12. Head and thorax of *D. cucujinus*, female.

PLATE VIII.

Fig. 1. *Vesperoctenus Flohri* Bates.
Fig. 2. Head of same, front view.
Fig. 3. Hind tarsus of same.
Fig. 4. *Acmæodera cribricollis* Horn.
Fig. 5. *Acmæodera maculifera* Horn.
Fig. 6. *Acmæodera scapularis* Horn.
Fig. 7. *Trichodes peninsularis* Horn.
Fig. 8. *Dysphenges elongatulus* Horn.
Fig. 9. *Xestobium elegans* Horn, antenna.
Fig. 10. Thorax of *Thermonectes peninsularis* Horn.

NOTES ON CROTALUS MITCHELLII AND "CROTALUS PYRRHUS."

BY JOHN VAN DENBURGH.

Among many interesting reptiles in the collection of the California Academy of Sciences are ten specimens of *Crotalus mitchellii*, which throw much light upon the variation and distribution of this little-known species.

Crotalus mitchellii was first described by Professor Cope (Proc. Acad. Phil., 1861, p. 293) from a single specimen collected by Mr. John Xantus at Cape St. Lucas, Lower California. Mr. L. Belding secured another individual at La Paz in 1882. These seem to be the only specimens of this species which have reached herpetologists, from this region.

Five years later (l. c. 1866, pp. 308 and 310) Professor Cope described a rattlesnake, obtained by Dr. Elliott Coues near Fort Whipple, Arizona, under the name of *Caudisona pyrrha*.

C. pyrrhus was stated to differ from *C. mitchellii*—

1st, by being "salmon red (pale vermillion)" instead of "greyish yellow";

'pepper and salt' appearance. The larger blotches on the back are very wide (transversely) and of a brownish clay color, becoming brighter posteriorly; the borders of these blotches are marked with more or less isolated blackish spots. In Dr. Street's report the paleness of his specimen is attributed to fading in alcohol, but as Mr. Orcutt's specimens were received quite fresh, it is evident that it is the type which is unusually colored, and not the others." This "pepper and salt" style is the coloration of *C. mitchellii*, as exhibited by eight of the specimens in the California Academy, and about as set forth in the original description. When it has been said that the other specimens of *C. mitchellii* in the California Academy collection, from Las Huavitas and Sierra El Taste, Lower California, are both decidedly red, as described below, it will be seen that there remains no color distinction between the supposed two forms.

In regard to the second and third distinctions, Dr. Stejneger has written (l. c. p. 167): "The original character relied upon for the distinction of these two species, viz., the number of loreals, there being one in the type of *C. mitchellii* and four in that of *C. pyrrhus*, breaks down upon an examination of the specimens which have come to light since. In this respect Mr. Orcutt's larger specimen is particularly interesting, inasmuch as on one side of the head it has a very long lower preorbital, the condition which obtains in *C. mitchellii*, while on the other side this plate is divided as in the other specimens of *C. pyrrhus*." The worthlessness of these characters is further shown by the great variation in the number, size and shape of these plates in the Academy specimens, as described below.

The fourth distinction is scarcely worthy of mention, there being so much variation in the shape of the rattle in other species. The series of *C. mitchellii* shows it to be valueless as a specific character, the difference in shape being perhaps due to the presence or loss of its terminal segments.

The fifth and sixth points of difference likewise prove to be untenable. Four of the ten specimens which I have been able to examine have sixteen labials, two have fifteen, two fourteen, and two have fifteen on the right side and sixteen on the left. The number of smooth rows of scales varies from none to two.

The original distinctions between *C. mitchellii* and *C. pyrrhus* are thus all disposed of, but Dr. Stejneger adds (l. c. p. 167): "I have not the type of *C. mitchellii* at hand now, but a second specimen was collected by Mr. L. Belding at La Paz, L. C., in 1882, and, judging from this, the chief difference seems to consist in the double row of small scales interposed between the rostral and the prenasal, while in all the known specimens of *C. pyrrhus* there is only a single series. By this means the nostrils in *C. mitchellii* appear to be placed further back, and the space between nostril and eye is correspondingly shortened." This character also fails upon posteriorly. Dotted everywhere above with dark brown and black. This is much the palest of the ten. Length, 29.20 inches, exclusive of rattle.

C. A. S., No. 654. Las Huavitas, L. C., W. E. Bryant, 1889. Loreals 3–4. Lower preorbitals very small, upper very large. Right prenasal very large, in contact with rostral. Left prenasal obsolete, nostril separated from rostral plate partly by two, partly by three rows of scales. Labials fifteen to sixteen. One row of smooth scales. Color, bright vinaceous-cinnamon, more pinkish on head and neck. Dorsal markings faintly indicated anteriorly by a slight deepening of the ground color in patches, about whose edges the deep brown and black punctulations are more or less crowded. Posteriorly these markings reach the gastrosteges and become first hazel, then chestnut. The tail is gray with three black bars. Length to base of rattle, twenty-five inches.

C. A. S., No. 764. Sierra El Taste, Cape Region Lower California, Dr. Eisen, Sept., 1893. Loreals 3–3. Two preorbitals on right side, lower very long and narrow. Three preorbitals on left, lower as on right. Inter-naso-rostrals in partly one and partly two series on right side; two series on left. Labials sixteen. One row of smooth scales. Ochraceous-rufous mixed with ochraceous-buff. Dark dorsal patches, visible even on neck, cinnamon with a crowding of the black dots which occur on almost the whole upper surface. Top of head Vandyke brown, changing to hair brown on temples. Band under eye, and labials salmon-buff, the latter with cream-colored tips. Tail gray, with black cross-bars. Length to rattle, 35.75 inches.

C. A. S., No. 765. San José del Cabo, L. Cal., Dr. G. Eisen, Oct., 1893. Loreals 2–4. Preoculars—Lower, on each side, is narrow and very long; upper on left is normal, on right twice as large, evidently having united with what is on the left side the largest loreal. Inter-naso-rostrals in partly one and partly two series on each side. Fourteen labials. No row of smooth scales. Colors of this and the following specimens about as stated in the original description. Length, 36.75 inches.

C. A. S., No. 768. San José del Cabo, L. C., Dr. Gustav Eisen, Sept., 1893. Loreals 3–3 Preoculars normal. Inter-naso-rostrals are in two series on right, partly one and partly two on left side. Sixteen labials. One row of smooth scales. Length, 34 inches.

C. A. S., No. 766. In bottle containing also some lizards, a turtle, and a label saying: "Terrapin from mainland abreast of San José Is." Loreals 2–4. Preoculars 2–3. One series between nasal and rostral on each side. Sixteen labials. Two series of smooth scales.

C. A. S., No. 767. San José del Cabo, L. C., Dr. G. Eisen, Sept., 1893. Loreals 1–1. Preoculars normal (*i. e.*, two on each side, the lower being very long and narrow). Inter-naso-rostrals in one series on each side. Labials fourteen. One series of smooth scales. Length, 34.60 inches.

Two series of inter-naso-rostral scales on each side. No row of smooth scales. Labials 15–16.

Crotalus pyrrhus is, therefore, a name which has been applied to northern specimens of *C. mitchellii*, and must be regarded as a synonym of the latter (earlier) name.

Besides the ten in the collection of the California Academy, as mentioned above, the known specimens of *Crotalus mitchellii* are, then, eight in number, as follows:

MUSEUM.	No.	LOCALITY.	COLLECTOR.	REMARKS.
Smithsonian Inst.	5291½	Cape St. Lucas, Lower Cal.	John Xantus	Type.
U. S. National	12625	La Paz, Lower Cal.	L. Belding	
do.	6606	Cañon Prieto, Arizona	Dr. E. Coues	Type of C. pyrrha
do.	8669	Mojave Desert, Arizona	Dr. O. Loew	Head only.
do.	8562	Angel de la Guardia Is., Gulf of Cal.	Dr. T. H. Streets	
do.		do.	Chas. H. Townsend	
do.		Colorado Desert, San Diego Co., Cal.	C. R. Orcutt	Near "Mt. Springs."
do.		do.	do.	do.

PHRYNOSOMA SOLARIS, WITH A NOTE ON ITS DISTRIBUTION.

BY JOHN VAN DENBURGH.

On page 229 of his "Catalogue of the Specimens of Lizards in the British Museum" (published in 1845), J. E. Gray, in the enumeration of specimens of *Phrynosoma coronatum*, wrote "d—Adult, in spirits. The spines on the occiput forming a continued frill. California. *P. solaris* Gray, B. M."

This description, though so short, states the character which separates the species, now universally known as *Phrynosoma regale*, from all other known members of the genus. Since the A. O. U. Code expressly says that an identifiable description is sufficient for the establishment of a specific name, and since it was not until 1858 that Girard* described the same species under the name of *P. regale*, the latter is a synonym of, and must give place to, *P. solaris* Gray.

It seems strange that this name has been so generally ignored by herpetologists since Gray. Indeed, Cope

DESCRIPTIONS OF FOUR NEW POCKET MICE FROM LOWER CALIFORNIA, COLLECTED BY WALTER E. BRYANT.

BY DR. C. HART MERRIAM.

Some time ago Mr. Walter E. Bryant sent me a collection of Pocket Mice, obtained by himself during his explorations in the Peninsula of Lower California. The collection comprises 40 specimens (skins and skulls), chiefly from the Cape Region and adjacent Islands of San José and Santa Margarita, and also from Comondu near the central part of the Peninsula. Critical examination of this material shows it to contain four undescribed forms, all in the sub-genus *Chætodipus*, three of which belong to the *spinatus* group—previously known from a single species inhabiting the Colorado Desert. The fourth is a small representative of the *penicillatus* group, the range of which is thus carried southward to San Jorge, near Comondu. Unfortunately only a single specimen was obtained, the large series from Comondu consisting wholly of a member of the *spinatus* group intermediate between *spinatus* and *peninsulæ*. The largest and handsomest of the new species was found on San José Island, and it gives me much pleasure to associate with it the name of Mr. Bryant, who has done more than all others to make known the fauna of this part of Mexico.

The accompanying figures belong to the U. S. Department of Agriculture. Permission to use them in the present connection was granted through the courtesy of Dr. Chas. W. Dabney, Jr., Assistant Secretary of Agriculture.

Perognathus bryanti* sp. nov.

Type from San José Island., Lower California. No. $\frac{561}{564}$ ♂ ad. Collection of California Academy of Sciences. Collected May 2, 1892, by Walter E. Bryant. Original number, 629.

Measurements (taken in flesh).—Type: Total length, 216; tail vertebræ, 127; hind foot, 25. Ear from anterior base, 9.5 (in dry skin).

Average measurements of three specimens from type locality: Total length, 215; tail vertebræ, 124.6; hind foot, 25.3; ear from notch, 11.

General characters.—Similar to *C. spinatus* but much larger, with a much longer and more heavily crested tail; ears longer and darker; whiskers longer and heavier, reaching middle of back; pelage everywhere coarser and more spiny; rump spines conspicuous as in *spinatus*.

Color.—Upper parts drab gray, becoming brownish on the back in old pelage, plentifully lined with black hairs; under parts, fore and hind feet and fore legs white; no lateral stripe; tail bicolor, dusky somest species of the *spinatus* group. It has a long and heavily crested tail, and differs from *peninsulæ* much as *P. formosus* of Dulzura, Cal., differs from *P. fallax* of the adjacent region.

Perognathus margaritæ sp. nov.

Type from Santa Margarita Island, Lower California. No. 90 ♀ ad. Collection of California Academy of Sciences. Collected March 2, 1889, by Walter E. Bryant. Original number, 231.

Measurements of type (taken from dry skin).—Total length, 170; tail vertebræ, 102; hind foot, 22.5; ear from anterior base, 8.5.

Average measurements of two specimens from type locality (measured in flesh): Total length, 182; tail vertebræ, 101; hind foot, 22.5.

General characters.—Similar to *C. spinatus*, but somewhat larger and darker; decidedly smaller than either *bryanti* or *peninsulæ*; rump spines smaller than in *spinatus* and *bryanti*; tail rather short and slender and only sparsely crested; resembles *peninsulæ* very closely in external appearance, but differs in cranial characters and size.

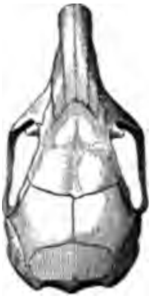

Fig. 2. *P. margaritæ.*

Color.—Upper parts varying from drab-gray on sides to grizzled black and yellowish-brown on back, from coarse admixture of black hairs: under parts and feet white; tail bicolor, dusky above, whitish beneath.

Cranial characters.—Skull similar to *spinatus*, but slightly longer, more arched and relatively narrower posteriorly; interparietal broadest in the middle instead of anteriorly, with parieto-occipital suture opposite middle, instead of anterior corner (much as in *californicus*);

lachrymals decidedly larger; posterior ends of nasals and premaxillary together forming a deep emargination. Total length of skull, 25; mastoid breadth, 12. (In *spinatus* the length is 23.5, while the mastoid breadth remains the same, 12.)

Perognathus spinatus peninsulæ subsp. nov.

Type from San José del Cabo, Peninsula of Lower California. No. 274 ♂ yg. ad. Collection of California Academy of Sciences. Collected September 11, 1891, by Walter E. Bryant. Original number, 460.

Measurements (taken in flesh).—Type: Total length, 198; tail vertebræ, 107; hind foot, 23. Ear from anterior base, 9 (in dry skin).

Average measurements of three specimens from type locality: Total length, 195; tail vertebræ, 108.6; hind foot, 24.

General characters.—Similar to *C. spinatus* but considerably larger, with much larger ears, and coarser pelage [pelage less coarse than in *bryanti*]; rump spines as in *spinatus;* tail slender and sparsely crested as in *spinatus*—not heavily crested as in *bryanti*.

that specimens from the middle part of the peninsula (Comondu) are intermediate between it and *spinatus*.

Perognathus arenarius sp. nov.

Type from San Jorge, near Comondu, Lower California. No. 99 ♀ ad. Collection of California Academy of Sciences. Collected March 17, 1889, by Walter E. Bryant. Original number, 242.

Measurements (taken from well made dry skin).—Type: Total length, 136; tail vertebræ, 70; hind foot, 20; ear from anterior base, 7.

General characters. — Size smallest of the known species of *Chœtodipus;* pelage hispid but not spiny; no spines on rump or elsewhere; tail rather short and only sparsely crested; skull broad and square.

Color.—Upper parts drab-brown, darkest along the middle of the back, and not noticeably mixed with black-tipped hairs; under parts, fore legs and feet and hind feet white; no lateral line; tail bicolor, brownish above, white beneath.

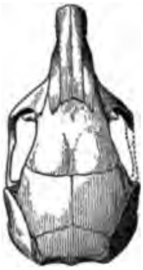
Fig 4. *P. arenarius.*

Cranial characters.—Skull short and broad; maxillary arms of zygoma standing out squarely and widely, so that the zygomata are parallel instead of narrowing anteriorly; interparietal more than twice as broad as long, strap-shaped or broadly and flatly pentagonal, broadest in front; parieto-occipital suture opposite antero-lateral corner of interparietal; audital bullæ much swollen and rather short. Total length of skull, 22.5; mastoid breadth, 12; zygomatic breadth anteriorly, 11.

General remarks.—*P. arenarius* is a member of the *penicillatus* series, and is the smallest species of the group yet described.

Average measurements of Pocket Mice of the *Perognathus spinatus* group:

		Total length.	Tail vertebræ.	Hind foot.	No. of specimens averaged.
P. margaritæ.........	Santa Margarita Id., L. Cal.	182	101	22.5	2
P. bryanti............	San José Id., "	214.6	124.6	25.3	3
P. spinatus peninsulæ..	San José del Cabo, "	195	108.6	24	3
Intergrades between *spinatus* and *peninsulæ*.	Comondu, "	188	111.5	22	8
P. spinatus...........	Colorado Desert, California.	172	99	21.4	[illegible]

THE ODONATA OF BAJA CALIFORNIA, MEXICO.

BY PHILIP P. CALVERT,
University of Pennsylvania, Philadelphia.

(With Plates xv, xvi, xvii.)

In January, 1893, I was offered for examination a small collection of dragon-flies from Baja California belonging to the California Academy of Sciences and was asked to prepare a memoir upon the subject. Upon my acceptance of this proposal, dry specimens collected by Mr. Charles D. Haines in various localities, and others in alcohol, mainly from San José del Cabo, were sent to me. The examination of this lot was well nigh completed when, in December, 1893, a much larger collection in alcohol, made, as the labels showed, mainly by Dr. Gustav Eisen, in the Cape Region, in September and October, 1893, was received by me. No further collections being then contemplated by the Academy, this paper was completed, but in January, 1895, I received additional collections from the Cape Region made by Dr. Eisen and Mr. Frank H. Vaslit in September, 1894. The total number of specimens which I have thus been able to examine has been over 2600, representing forty species.

The objects of this paper are:

1. To give a complete list, with localities, of the Odonata of Baja California. If we except two or three brief notices of a line each, nothing has hitherto been published on the dragon-flies of this region.

2. To describe and figure such of the species as had hitherto not been sufficiently illustrated.

3. To determine the amount of variation in structural details, especially in the venation of the wings, assumed to be of generic character. For lack of time, I have not included the collections made in September, 1894, in es-

timating the amount of variation, except where the contrary is expressly stated.

A brief summary of the results obtained follows.

1. The Mexican territory of Baja California, comprising the peninsula of Old or Lower California, is some 750 miles long, and stretches in latitude from 32° 34′ N to 22° 50′ N. Its lower portion, the Cape San Lucas region, thus lies within the tropics. Of this Cape Region, Mr. T. S. Brandagee states: "The Flora of the coast is subtropical and a considerable portion West Indian, many of the plants perhaps introduced; that of the elevated regions is largely Sonoran."

Collections of Odonata were made at the following places:

(*a*) in the upper or supra-tropical portion, chiefly by Mr. Haines, at El Rosario 30° 7′ N, 115° 38′ W.*

San Raymundo 25° 16′ N, 111° 19′ W, or 30° 41′ N, 115° 48′ W.

Comondu 26° 18′ N, 111° 53′ W.

San Luis 25° N, 111° 7′ W, or 24° 58′ N, 111° 54′ W.

El Paraiso 28′ 40′ N, 113° 34′ W.

Considering the peninsula as a whole, the number and names of the species are:

Subfamily CALOPTERYGINÆ (1 sp.)

1. *Hetærina californica* Hag.

Subfamily AGRIONINÆ (11 sp.)

2. *Archilestes grandis* Ramb.
3. *Argia agrioides* (Selys MS.)[*]
4. *Argia vivida* Selys.
5. *Argia cupræa* Hag.
6. *Argia ænea* Selys.
7. *Erythragrion salvum* Hag.
8. *Enallagma cæcum* Hag.
9. *Enallagma Eiseni.*[*]
10. *Ischnura Ramburii*, var. *credula* Hag.
11. *Ischnura exstriata.*[*]
12. *Ischnura cervula* Selys.

Subfamily GOMPHINÆ (2 sp.)

13. *Progomphus obscurus* Ramb.
14. *Octogomphus specularis* Selys.

Subfamily ÆSCHNINÆ (6 sp.)

15. *Æschna luteipennis* Burm.
16. *Æschna cornigera* Brau.
17. *Æschna multicolor* Hag.
18. *Æschna constricta* Say.
19. *Anax junius* Dru.
20. *Anax Walsinghami* McLach.

Subfamily LIBELLULINÆ (20 sp.)

21. *Pantala flavescens* Fabr.
22. *Pantala hymenæa* Say.
23. *Tramea onusta* Hag.
24. *Tramea longicauda* Brau.? var.
25. *Libellula saturata* Uhler.
26. *Pseudoleon superbus* Hag.
27. *Orthemis ferruginea* Fabr.
28. *Dythemis sterilis* Hag.
29. *Dythemis russata* (Hag. MS.)[*]
30. *Dythemis mendax* Hag.
31. *Macrothemis imitans* Karsch.
32. *Macrothemis inequiunguis.*[*]
33. *Trithemis basifusca.*[*]
34. *Micrathyria didyma* Selys.
35. *Micrathyria Hagenii* Kirby.
36. *Micrathyria æqualis* Hag.
37. *Diplax corrupta* Hag.
38. *Diplax illota* Hag.
39. *Cannacria furcata* Hag.
40. *Mesothemis simplicicollis*, var. *collocata* Hag.

Of the above, nine species—*Hetærina californica*, *Progomphus obscurus*, *Æschna multicolor*, *Æ. constricta*, *Anax junius*, *Pantala hymenæa*, *Libellula saturata*, *Diplax corrupta*, *Mesothemis simplicicollis*—are distributed over a considerable part of temperate North America, especially the western part. *Dythemis russata* is only known elsewhere from Arizona, *Dyth. mendax* from Texas.

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[*] New species.

Anax Walsinghami, *Diplax illota*, *Ischnura exstriata*, *I. cervula* and *Octogomphus specularis* are Pacific Coast species, the last three being known elsewhere from California only. *Argia agrioides* and *A. vivida* also inhabit California and Texas. Eighteen species are thus chiefly Nearctic in distribution, although all are not confined to that province, while some may be entitled to rank as "Sonoran."'

Species of mainly Neotropical distribution, eighteen in number, are *Argia cupræa*, *A. ænea*, *Pseudoleon superbus*; *Enallagma cæcum*, *Ischnura Ramburii* var. *credula*, *Tramea onusta*, *Orthemis ferruginea*, *Micrathyria didyma*, *M. Hagenii*, *M. æqualis*, *Cannacria furcata*; *Archilestes grandis*, *Erythragrion salvum*; *Æschna luteipennis*, *Æ. cornigera*, *Tramea longicauda*, *Dythemis sterilis*, *Macrothemis imitans*. Of these, the first three are confined to Mexico, the second group of eight occur in the West Indies and elsewhere, the last five were not hitherto known to exist outside of South America.

Lastly, *Enallagma Eiseni*, *Macrothemis inequiunguis*, and *Trithemis basifusca*, all here described as new, are, according to our present knowledge, restricted to Baja figures of two new species, *Ischnura ? erratica* and *Æschna californica*, while special mention must be made of the reported occurrence in California of *Calopteryx maculata* not hitherto known west of Kansas, *Euthore fasciata* of Venezuela and Colombia, and *Epophthalmia elegans* of China and Japan (see the appendix).

3. The generic variations given are, first, variations from conditions assumed by other writers to be generic; second, variations from those adopted in this paper as generic. They are to be found under the respective species.

A few words should be said on the specimens preserved in alcohol. Dr. Eisen having written that collections could be made in that way, I suggested that the insects should be placed at once in strong, warm alcohol. The result has been to preserve the bright and brilliant colors of these dragon-flies in a most gratifying way, and it is difficult to believe that after a lapse of one year any considerable fading has taken place. Such magnificent colors as those of *Anax Walsinghami*, *Æschna luteipennis*, *Libellula saturata*, etc., have thus been as available for description as if from fresh individuals. It should be stated that, except when under examination, the specimens have been kept in alcohol and in the dark.

I desire to acknowledge the valuable assistance rendered me by the Baron Edmond de Selys-Longchamps, of Liége, Belgium, on the difficult genus *Argia* as mentioned in the text. Mr. Samuel Henshaw has done me the great kindness of comparing specimens of *Enallagma Eiseni*, *Dythemis sterilis* and *Trithemis basifusca* with the collection in the Museum of Comparative Zoology at Cambridge, Mass.

CHARACTERS OF THE MAJOR GROUPS.*

Suborder I. ZYGOPTERA. Front and hind wings similar in shape or nearly so, usually elevated in repose; no membranule; with an unmodified quadrilateral. Males with two inferior terminal abdominal appendages, penis and its vesicle separate. Nymphs with three caudal tracheal-gills.

Family 1. AGRIONIDÆ. Head transversely elongated; eyes separated from each other; lateral lobes of the labium of two joints, middle lobe bifid. Females with genital valves.

Subfamily 1. *Calopteryginæ.* At least five, and usually more antecubitals.

Subfamily 2. *Agrioninæ.* Two, occasionally three, antecubitals, wings stalked at base, quadrilateral not cross-veined (except in the S. Amer. *Anomisma*).

Suborder II. ANISOPTERA. Wings dissimilar, hind wings usually broader at base; horizontal in repose; usually with a membranule; quadrilateral modified to form a cardinal cell (triangle) and a supratriangle. Males with one inferior terminal abdominal appendage, penis and its vesicle connected. Nymphs without caudal tracheal-gills.

Family 2. ÆSCHNIDÆ. Triangles of front and hind wings of similar shape (except in some Gomphinæ). Antecubitals of first and second series not coincident, except the first and one other (the latter is variable in position) which two are thicker than their fellows. Postcubitals in the entire second series. Lateral lobes of the labium of two joints. Males often with auricles on 2, and the anal margin of the hind wings excavated.

Subfamily 3. *Gomphinæ.* Head transversely elongated, eyes sep-

Family 3. LIBELLULIDÆ. Triangle of front wings with its long axis at right angles to the length of the wing, triangle of hind wings with its long axis coinciding with that of the wing. Antecubitals of first and second series mostly coincident. No postcubitals in the nodal end of the second series. Lateral lobes of the labium of one joint. Head globose, eyes meeting on the top of the head. Abdomen with lateral carinæ. Females without genital valves.

Subfamily 6. *Cordulinæ*. Hind margin of eyes produced as a small tubercle. Usually a small bundle of fine hairs on the distal anterior surface of the first femora. Males with auricles on 2, anal margin of hind wings excavated, distal end of first tibiæ with an inferior carina.

Subfamily 7. *Libellulinæ*. Hind margin of eyes not produced as a small tubercle, or with a mere trace of such. Males without auricles on 2, anal margin of hind wings not excavated.

No Cordulegasterinæ or Cordulinæ are known to inhabit Baja California.

CHARACTERS OF THE GENERA (imagos only).

Subfamily CALOPTERYGINÆ.

Legion *Calopteryx* Selys. Sectors of the arculus arising from below its middle, antecubitals of first and second series nearly equal in number, quadrilateral as long as the basilar space, pterostigma absent or of from one to several cells. Epistoma not projecting as much as the length of the eyes.

Basilar space cross-veined, arculus not broken, no inferior branch to the lower sector of the triangle; ♂ wings with a basal red spot, cells of postcostal space on front wings irregular. *Hetærina.*

Subfamily AGRIONINÆ.

I. Legion *Lestes* Selys. Median and subnodal sectors parting from the principal sector much nearer the arculus than the nodus; ♂ superior appendages forcipated.

Nodal sector parting from the principal one and a half cells after the nodus; supplementary sectors between the subnodal and the median, and the median and the short, and other sectors. *Archilestes.*

II. Legion *Agrion* Selys. Median and subnodal sectors parting from the principal sector near the nodus; quadrilateral trapezoidal, upper side shorter than the lower, lower outer angle acute: no supplementary sectors except the ultra-nodal; lower sector of the triangle extending to the hind margin of the wing; pterostigma of but one cell.

Hairs of the tibiæ about twice as long as the intervals between them; a single row of postcostal cells; arculus complete, lying in the prolongation of the second antecubital; tarsal nails toothed, tooth shorter than the nail proper. *Argia.*

Hairs of the tibiæ never twice as long as, but generally shorter than, the intervals between them; otherwise as in *Argia.*

♀ with no apical ventral spine on 8. Postcostal vein separating from the hind margin of the wing—in the majority of individuals—at the basal postcostal cross-vein or at a less distance in front than the latter is long;[*] no pale postocular spots; abdomen moderate; color red; tooth of tarsal nails very small. *Erythragrion.*

♀ with an apical ventral spine on 8.[†] Postcostal vein separating from hind margin of wing at least as far in front of the basal postcostal cross-vein as the latter is long; pale postocular spots present.

Pterostigma of ♂ similar in color on front and hind wings, no dorsal bifid process on 10 (except *E. exsulans* ♂). *Enallagma.*

Pterostigma of ♂ darker on front wings than on hind wings, 10 with a dorsal process, bifid at apex, in the males. *Ischnura.*

Subfamily GOMPHINÆ.

Legion *Gomphoides* Selys. All or some of the triangles with cross-veins; membranule wanting or very small.

Feet moderate (hind femora reaching back to 1); front wings with upper side of triangle longer than the inner, outer side longest, broken, no supratriangulars, sectors of arculus separated at origin;

and median sectors curved at its middle away from the former or its posterior branch, with 3–7 rows of cells between them at that place. Subnodal sector forked or with several small branches. Suture between the eyes not longer than combined length of vertex and frons measured on mid-dorsal line. Subcosta not prolonged beyond the nodus. ♂ with anal triangle and anal angle on hind wings, and auricles on 2. *Æschna.*

II. Upper piece of arculus shorter than the lower piece, its upper sector arising close to the median vein (midway between the latter and the lower sector). External branch of lower sector in hind wings approaching the upper sector for its apical half, being parallel to it and separated by one row of cells. 4 (♂) or 5 (♀)–10 usually with a supplementary lateral carina above the usual one. ♂ with no anal triangle on hind wings, anal angle rounded off, no auricles on 2. *Anax.*

Subfamily Libellulinæ.

I. Lower angle of triangle of front wings placed as far beyond the level of the outer angle of the triangle of the hind wings, as the latter triangle is long; eyes connected for a space at most not much greater than the thickness of the vertex; no antenodel concavity on front margin of wings; tarsal nails toothed.

Ab. seg. 3 and 4 with two additional transverse carinæ, 5 with one; nodal sector waved; anterior lamina of ♂ bifid. *Pantala.*

Ab. seg. 3 and 4 with one additional transverse carina, 5 with none; sectors of arculus arising from a common stalk; triangle of front wings crossed; nodal sector not waved or broken; anterior lamina of ♂ entire. *Tramea.*

II. Lower angle of triangle of front wings placed on a level with the outer angle of the triangle of the hind wings or only a little beyond it; otherwise as in (I).

A. Hind lobe of the prothorax with its middle portion produced upwards and backwards and narrower than the other lobes, its hind margin usually entire; triangle not densely reticulated.

a. Sectors of the arculus in the front wings not arising by a common stalk.

Nodal sector waved in its middle, supratriangulars present on front wings, triangle of hind wings often crossed, ♂ with no ventral hooks on 1st ab. seg., ♀ with no projecting vulvar lamina. *Libellula.*

b. Sectors of the arculus in the front wings variable with or without a common stalk at origin.

Nodal sector waved in its middle, triangle of hind wings cross veined, ♂ with no ventral hooks on 1st ab. seg., ♀ with vulvar lamina projecting at right angles to the abdomen. *Pseudoleon.*

c. Sectors of the arculus in the front wings arising by a distinctly common stalk; triangle of hind wings free. (Triangle of front wings not broken to form a trapezium.)

Last antenodal on front wings continued to the median vein; inner side of triangle of hind wings in the prolongation of the arculus.

Nodal sector distinctly waved in its middle, frons without lateral vertical carinæ as in Orthetrum, vertex concave at tip, no supratriangulars, abdomen stout. *Orthemis.*

Last antenodal on front wings not continued to the median vein.

Sectors of the triangle in the hind wings arising from the hind angle.

Nodal sector waved in its middle, inner side of the triangle of hind wings in the prolongation of the arculus, triangle of front wings cross-veined. *Dythemis.*

Nodal sector not waved in its middle, no supratriangulars, no additional carina on 4th ab. seg.

Triangle of front wings free, tooth of tarsal nails as long as tip of nail itself (except in *M. inequiunguis*). *Macrothemis.*

Triangle of front wings cross-veined except frequently in *T. minuscula* Ramb., tooth of tarsal nails much shorter than tip of nail itself. *Trithemis.*

Sectors of the triangle in the hind wing arising, the lower

the last antecubital usually not continued to the median vein; abdomen stout, hardly as long as the hind wings, third tibiæ with the spines of the antero-inferior row few (5–7) and stout; hamule of ♂ bifid. *Mesothemis.*

The generic characters given above have been drawn up with the intention of making them definitive as absolutely as possible, and not merely with reference to the forms found in Baja California.

Subfamily CALOPTERYGINÆ.

HETÆRINA Hagen.

Hagen, Syn. Calopt. p. 30, 1853; Mon. Calopt. p. 96, 1854. Walker, List Neur. Ins. Brit. Mus. iv, p. 616, 1853. Calvert, Trans. Am. Ent. Soc. xx, p. 220, 1893.

1. HETÆRINA CALIFORNICA Hagen.

Hagen, Bull. Ac. Belg. (2) vii, p. 440, 1859; Syn. Neur. N. A. p. 59, 1861. Selys, Bull. Ac. Belg. (2) xxxv, p. 480, 1873. Hagen, Proc. Bost. Soc. Nat. Hist. xviii, p. 23, 1875.

Three males, two females, Comondu, March, 1889, by Chas. D. Haines.

They differ from the types by their smaller size (abdomen ♂ 28.5 mm., ♀ 24, hind wing ♂ ♀ 22.5–23.5), less number of antecubitals (17–21), and the lesser extent of the basal red spot on the wings of the males, which reaches but little more than half-way from the base to the nodus, instead of four-fifths. Nevertheless they do not appear to differ specifically from more typical individuals from Shasta County, California, in the collection of the American Entomological Society in Philadelphia. In the writer's collection are specimens from San Bernardino, California, by Mr. P. C. Truman, which are similar to those from Comondu.

Californica is characterized by the absence of a pterostigma in both sexes, and of red spots at the tips of the wings of the male. Baron de Selys wrote (*l. c.* 1873)

"It appears decidely impossible to separate specifically *californica* from *basalis*, which itself is probably only a race of *americana*. The forms are identical and the coloring of the wings is the same in the first two of these nominal species. *Californica* only differs from *basalis* by the absence of the pterostigma......and has hitherto only been observed in California where it is found at the same time as the type of *basalis*."

One male from California, also sent by the California Academy, is perhaps to be referred to Walsh's *texana* with which the *basalis* of Hagen's Synopsis of 1861, p. 60, is said to be identical. A male from Denver, Colorado, by Mr. E. V. Beales, in the writers's collection has the abd. 34.5, h. w. 24, and a very small pterostigma—smaller than in any eastern or Texan specimens of *americana*, *scelerata*, *texana*, etc.; otherwise very much like *californica*. Lastly Hagen (1875) cites *californica* from Montana.

A number of the species of *Hetærina* created by Walsh can not, in the writer's opinion, be maintained as such, as an examination of a considerable series of individuals shows that those characters by which he separated them,

Subfamily AGRIONINÆ.

ARCHILESTES Selys.

Selys, Bull. Ac. Belg. (2) xiii, p. 294, 1862.

2. ARCHILESTES GRANDIS Rambur. Pl. xv, figs. 10–11.

Lestes g. Ramb. Ins. Nevr. p. 244, 1842. Hagen, Syn. Neur. N. A. p. 66, 1861. *A. g.* Selys, Bull. Ac. Belg. (2) xiii, p. 294, 1862.

	1 ♀	(teneral) Comondu.
1 ♂	1	San José del Cabo.
	1	San José del Cabo, Sept., 1893, G. Eisen.
24	18	San José del Cabo, Oct., 1893, G. Eisen.
5	2	Mesa Verde, Oct., 1893, G. Eisen.
1		Sierra Laguna 2000 ft., Oct., 1893, G. Eisen.
	2	Sierra El Taste, Sept., 1893.
5	1	San José del Cabo, Sept., 1894, Eisen & Vaslit.
36 ♂	26 ♀	

The only known species of the genus. As mentioned by Rambur in his original description, the greatest part of the last two segments of the male are yellowish, or perhaps bluish; in the female it is only the tenth segment which is mostly pale in color.

Distribution. U. S. Colombia, Venezuela, Mexico (Vera Cruz, Guanajuato, Baja California), Texas (Blanco Co., P. P. Calvert's coll.)

ARGIA Rambur.

Rambur, Ins. Nevr. p. 254, 1842. Selys, Bull. Ac. Belg. (2) xx, p. 382, 1865. Calvert, Trans. Am. Ent. Soc. xx, p. 220, 1893.

Synopsis of the species of Peninsular California.

I. Rear of the head blue in life.

1. A black basal streak on each side of 3–5 or 6 in ♀ but not in ♂; upper half of black humeral stripe usually forked; femora with an anterior and a superior black line. ♂ Apex of sup. app. rounded, entire, with a small inner, inferior, anteapical denticle. ♀ 8–9 or 10 with a black, basal streak each side. *agrioides* (Selys MS.) n. sp.
2. A black basal streak on each side of 3–5 or 6 in both ♂ and ♀; upper half of black humeral stripe usually not forked; the two black lines on the femora often fused together. ♂ Apex of sup. app. an acute angle, a minute tubercle on outer side of appendage. ♀ 8–10 unspotted with black, or 9 only with a black basal spot each side. *vivida* Selys.

II. Rear of head predominantly blackish.

3. Eyes brown above in life. ♂ Head and thorax mostly metallic violet; abdomen mostly black; sup. app. half as long as 10, apical third bifid, outer-upper branch larger. ♀ Head and thorax and abdomen mostly black, 10 blue, 9 blue with a black spot each side at base.
cupræa Hagen.

4. ♂ Eyes bright red in life; head and thorax mostly metallic brown; abdomen mostly violet or violet-blue, with black markings; sup. app. nearly as long as 10, extreme apex bifid, branches equal.
ænea Selys.

3. ARGIA AGRIOIDES (Selys MS.) n. sp. Pl. xv, fig. 14.

5♂	9♀	Comondu.
5	1	Baja Purisima, April, 1889, C. D. Haines.
1		El Rosario, May, 1889, C. D. Haines.
20	12	San José del Cabo, not dated.
1		San José del Cabo, Sept., 1893, G. Eisen.
3		San José del Cabo, Oct. 1893, G. Eisen.
4	2	Mesa Verde, Oct. 1893, G. Eisen.
1		Sierra El Taste, Sept., 1893, G. Eisen.
1	1	Miraflores, Sept., 1894, Eisen & Vaslit.
7	1	San José del Cabo, Sept., 1894, Eisen & Vaslit.
48♂	26♀	

♂ Bright blue, the following black: sometimes a line from each antenna base to the anterior ocellus; a stripe from each eye to and behind the lateral ocellus of the second lateral suture; small marks on the metasternum; an anterior and a superior femoral line (tarsi brown); a small dorsal quadrangular spot on the basal half of 1; a basal streak and an apical spot on either side of 2, or streak and spot of each side united; apical fourth of 3–6, more or less cleft anteriorly on the mid-dorsal line, and often including a minute blue spot on either side; nearly all of 7 except a transverse basal ring and a minute apical spot each side (black sometimes divided by a narrow, mid-dorsal, longitudinal line); sterna and articulations of 3–7.

Apical dorsal half of 10 cleft, a blue bifid tubercle in the excision. Superior appendages half as long as 10, pale blue, apex rounded, entire, a small, black, inferior denticle on the inner side before the apex. Inferior appendages a little longer, pale blue, directed upwards, apex slightly notched when viewed in profile, upper division produced into a rather acute, dorsally directed black point, lower division rounded off.

Note. One male from Comondu, otherwise agreeing with the above description, has a black basal, streak on either side of 4–6, thus resembling *vivida.*

Males from Texas and Los Angeles, Calif., have the humeral stripe often not forked, no line on the upper end of the first lateral thoracic suture, no basal streak on 2, apical fifth of 3–6 black, apical streak on each side of 8–9. Females from Texas have no line on the first lateral suture, no basal streak on 2, the black on 7 divided longitudinally by a pale mid-dorsal line.

♀ Very pale lilac replacing the blue of the ♂; marked with black having a metallic green reflection, as in the ♂ except as follows: 3–7 with a basal streak each side in addition to the apex; 8–9 with a basal streak each side and indications of such on 10. Mid-dorsal thoracic carina usually, but not always yellowish. 10 cleft dorsally almost to base; appendages very short, not exceeding anal tubercle.

♂ ♀. Wings clear. Pterostigma brown, surmounting one cell. Front wings with 11–14 postcubitals, 4 discoidal cells (3 on one wing of one male, five on one wing of another ♂). Hind wings with 9–12 postcubitals, 3 discoidal cells (four in one wing only of two males).

Abdomen ♂ 23–27 mm., ♀ 23–25. Hind wing ♂ 17.5–20.5, ♀ 19–20.5. Having sent a pair ♂ ♀ of this species to Baron de Selys, he wrote that it "est peut être une espèce inédite que j'ai nommé *A. agrioides* MS. dans la collection de M. MacLachlan."

Distribution. Baja California as above, California (1 ♂ San Bernardino, Feb. or March, 1892, by Mr. P. C. Truman, 1 ♂ 2 ♀ Los Angeles, by Dr. A. Davidson, P. P. Calvert's coll.), Texas (Blanco Co., P. P. Calvert's coll.)

4. ARGIA VIVIDA (Hagen) Selys. Pl. xv, fig. 13.

A. v. Selys, Bull. Ac. Belg. (2) xx, p. 406, 1865.

2♂ 3♀ Comondu.

5 Baja Purisima, April, 1889, C. D. Haines.

blackish angle which lies on the inner (median) side of the inferior appendage of the same side of the body; a minute tubercle exists on the outer side of the appendage where the apical part is bent downwards. Inferior appendages similar to those of *agrioides*, or as in the male from Sierra Laguna, more deeply notched at apex, lower division more produced, more slender.

♀ Similar to the ♂. Last three segments unspotted or only 9 with a small black basal spot each side; mid-dorsal thoracic carina black; otherwise similar to *agrioides* ♀.

♂ ♀ Wings clear. Pterostigma luteous, surmounting one cell only or a little more than one cell. Front wings with 13–15 postcubitals, 4–5 discoidal cells. Hind wings with 11–14 postcubitals, 3–4 discoidal cells.

Abdomen ♂ 25–29.5, ♀ 26–29.5. Hind wing ♂ 19–23, ♀ 21.5–24.

Having sent a pair of this species to Baron de Selys, he wrote of it, "Je crois que c'est *vivida*."

Distribution. Baja California, as above; the male type came from Cape San Lucas, by Xanthus (Selys, *l. c.*); California (specimens in the Calif. Academy coll., and from San Bernardino, Feb.–March, 1892, by Mr. P. C. Truman, coll. P. P. C.), Texas (Blanco Co.—P. P. C. coll.), Nevada (Franktown, in June, by Mr. S. W. Denton, communicated by Mr. A. P. Morse).

5. ARGIA CUPRÆA Hagen. Pl. xv, fig. 12.

Agrion cupræum Hagen, Syn. Neur. N. A. p. 96, 1861. *Ar. c.* Selys, Bull. Ac. Belg. (2) xx, p. 407, 1862.

5♂	8♀	San José del Cabo, Oct., 1893, G. Eisen.
2		Mesa Verde, Oct., 1893, G. Eisen.
1		El Paraiso, May, 1889, C. D. Haines.
	1	Comondu, March, 1889, C. D. Haines.
4	2	Miraflores, Sept., 1894, Eisen & Vaslit.
1		Sierra San Lazaro, Sept., 1894, Eisen & Vaslit.
	2	San José del Cabo, Sept., 1894, Eisen & Vaslit.
13♂	13♀	

♂ Head black with a metallic violet reflection; a pale postocular spot, some marks along the hind margins of the eyes and the labrum obscure yellowish. Eyes brown above. Dorsum of thorax to first lateral suture very dark metallic violet, mid-dorsal carina black, a narrow yellowish-brown stripe, but very little antehumeral in position (almost obliterated in dry specimens); sides pale brownish, a black line on second lateral suture. Feet dark brown, third femora with a superior yellowish streak. Abdomen black, a narrow transverse basal blue ring on 3–7; 9 with an apical lilac (?) spot, variously trilobed anteriorly, or its apical half with a median, and a lateral lilac (?) spot each side. Superior appendages half as long as 10, dark brown, excavated below, apical third bifid, upper-outer branch larger, longer;* lower-inner branch pointed. Inferior appendages pale, longer, apex bilobed, apices of both lobes rounded, the lower-inner lobe the more slender, the upper-outer lobe with a black spot.

♀ Similar to the ♂, black replacing metallic violet, pale colors blue; a transverse blue stripe across the frons from apex almost to base; sides of abdomen inferiorly blue. Appendages half as long as 10, blue.

♂ ♀ Wings with a slight yellowish tinge. Pterostigma dark brown (♂) or luteous (♀), surmounting one cell only or more. Front wings with 13–20 postcubitals, 5 discoidal cells (6 in one wing of one female). Hind wings with 12–16 postcubitals, 4 discoidal cells (5 in one wing of one male).

Abdomen ♂ 34–35, ♀ 29–31. Hind wing ♂ 25–26, ♀ 23–26.

Baron de Selys examined one of the males from San José del Cabo, which had been dried after being in alcohol, and wrote of it, "me parait très-voisine de *cupræa*—peut être *cupræa* elle-même, mais à couleurs mètalliques puisque ternies; peut-être par le mode de dessication ou bien avoir été dans l'alcool."

Distribution. Mexico (Cordova, Baja California as above).

6. ARGIA ŒNEA (Hagen) Selys. Pl. xv, figs. 21–22.

A. œ. Selys, Bull. Ac. Belg. (2) xx, p. 407, 1862.
6 ♂ San José del Cabo, Oct., 1893, G. Eisen.
1 ♂ Mesa Verde, Oct., 1893, G. Eisen.

♂ Eyes above bright red, like sealing wax in appearance, behind brown, below cream colored. Head metallic brown; frons, genæ, rhinarium, mandibles, lips and a cuneiform postocular spot each side—ochre. Rear of head blackish, obscurely yellowish along the margins of the eyes below. Dorsum of prothorax and of thorax metallic brown, reaching almost as far on the latter as the (obsolete) first lateral suture; a short, narrow, ochre stripe on the upper half of the humeral suture, but not reaching the base of the front wings (this stripe sometimes obsolete), and above it a small isolated violet spot; sides of thorax behind first lateral suture violet, a black line on the second lateral suture; pectus pale luteous. Feet luteous or yellowish, femora superiorly, tibiæ inferiorly and tarsi black; the black on the second and third femora usually separated into two stripes in the proximal half. Violet or violet-blue predominant on the abdominal dorsum, the following markings black: a small mid-dorsal basal spot and an oblique stripe each side on 1; a longitudinal stripe on each side of dorsum of 2, dilated before the apex, and an inferior curved stripe on the sides; apical part (increasing from about the third on 3 to more than the half on 6) of 3–6 black, cleft anteriorly on the mid-dorsal line; almost the whole of 7, except a narrow, transverse, basal ring; an inferior, longitudinal stripe on the sides of 8–10; sterna of 8–10.

Hind margin of 10 notched in the middle, as usual in *Argia*, sides of notch thickened, Appendages black; superiors nearly as long as 10, slightly curved, extreme apex bifid, branches equal. Inferior appendages slightly longer, wider, directed upwards, inner edge blue, apex bifid, branches equal.

Wings clear; pterostigma dark brown, surmounting

ERYTHRAGRION Selys.

Selys, Bull. Ac. Belg. (2) xlii, p. 955, 1876.

7. ERYTHRAGRION SALVUM Hagen. Pl. xv, fig. 9.

Agrion s. Hagen, Syn. Neur. N. A., p. 85, 1861. *E. s.* Selys, Bull. Ac. Belg. (2) xlii, p. 962, 1876.

1♂		San Ignacio, April, 1889, C. D. Haines.
8		Baja Purisima, April, 1889, C. D. Haines.
2	1♀	Comondu.
41	17	San José del Cabo, no date.
1	2	San José del Cabo, Sept., 1893, G. Eisen.
2	1	San José del Cabo, Oct., 1893, G. Eisen.
3	2	Mesa Verde, Oct., 1893, G. Eisen.
	2	Miraflores, Sept., 1894, Eisen & Vaslit.
25	2	San José del Cabo, Sept., 1894, Eisen & Vaslit.
83♂	27♀	

♂ Differs from de Selys' detailed description as follows: "le commencement inférieur d'une raie humerale bronzée" is in reality posthumeral; there is a short bronze line at the upper ends of the humeral and second lateral sutures and on the upper vestige of the first lateral.

♀ Pattern of coloring as in ♂, yellowish-brown replacing red.

Abdomen ♂ 17.5–24, ♀ 20–22. Hind wing ♂ 11.5–15, ♀ 15–16.

Distribution. Mexico (Orizaba, Putla, Baja California as above), California (Los Angeles, by Dr. A. Davidson), Texas, Guatemala.

In his classification of the "grand genre Agrion" (*l. c.* 1876), Baron de Selys divides the "subgenera" in which there is "no spine or acute point at the apex of the eighth segment of the female underneath," into two groups as follows:

"1st section: Lower sector of the triangle arising in front of the basal postcostal nervule.

2d section: Lower sector of the triangle arising at the basal postcostal nervule or hardly in front."

As a matter of practice, the writer has found it convenient to paraphrase these two characterizations in this

I. Postcostal vein separating from the hind margin of the wing* at least as far in front of the basal postcostal cross-vein as the latter is long.

II. Postcostal vein separating from the hind margin of the wing at the basal postcostal cross-vein or at less distance in front than the latter is long.

The genus Erythragrion Selys belongs to the second of these two sections. It having been noticed that the specimens from Baja California varied with respect to the point of separation of the postcostal vein, the variations were carefully tabulated, as shown below, together with some other species for comparison. The table refers to the front wings only.

NAME OF SPECIES.	Number of individuals examined.	Postcostal vein separating from hind margin of wing			Case A in one front wing, Case B in the other.	Case A in one front wing, Case C in the other.
		at least as far in front of basal postcostal cross-vein as latter is long (Case A).	in front of basal postcostal cross vein at less distance than latter is long (Case B).	at the basal postcostal cross-vein (Case C).		
Erythragrion salvum.	55 ♂	18 ♂	29 ♂	3 ♂	5 ♂	
(Baja California.)	22 ♀	6 ♀	13 ♀	1 ♀	2 ♀	

cent. of the females vary in both front wings to such an extent as would place them in de Selys' first section and therefore outside of Erythragrion. The comparison with Pyrrhosoma is interesting from this consideration; Pyrrhosoma belongs to the first section, but it seems extremely doubtful whether there is any character which can be used to separate it generically from Erythragrion other than the one drawn from the point of separation of the postcostal vein. Now that the well-marked tendency in *E. salvum* towards the Pyrrhosoma character is known, can Erythragrion be maintained as a distinct genus or " subgenus " ?

ENALLAGMA Charpentier.

Charp. Lib. Eur. p. 21, 1840. Selys, Bull. Ac. Belg. (2) xli, p. 496, 1876.

Calvert, Trans. Am. Ent. Soc. xx, p. 221, 1893.

8. ENALLAGMA CŒCUM Hagen. Pl. xv, fig. 8.

Agrion c. **Hagen, Syn. Neur. N. A. p. 84, 1861.** ***E. c.*** **Selys, *l. c.* p. 528, 1876.**

14 ♂	**2 ♀**	**San José del Cabo, not dated.**
1	**1**	**San José del Cabo, Sept., 1893, G. Eisen.**
5	**1**	**San José del Cabo, Oct., 1893, G. Eisen.**
	1	**San José del Cabo, Sept., 1894, Eisen & Vaslit.**
20 ♂	**5 ♀**	

Differ from Selys' description (*l. c.*) as follows: ♂ Only a small black spot at upper end of second lateral thoracic suture, no ventral thoracic, bronze spot " prés de l'abdomen," black on 2 having the form of three sides of a square or of a U (similar to the black spot on the same segment of the European *Agrion puella*); a variable amount of black on the apex of 8, sometimes occupying as much as the apical third, with a complete transverse band uniting with the black of either side; the small internal tooth on the superior appendages is only a little beyond the middle, instead of at three-fourths the length. ♀ Epistoma violet or blue, a black mark between it and the frons, thorax probably bluish in life.

Eyes pale blue or green with two parallel, horizontal, black bands, of which the upper is less distinct.

Of twenty-two individuals (♂ ♀) specially examined, in twenty-one the nodal sector arises at the fifth postcubital on the front wings, at the fourth on the hind wings, while in the remaining one, a female, the point of origin is at the fourth on the front wings, at the third on the hind wings.

Distribution. West Indies (Cuba, Hayti, Porto Rico, St. Thomas, Trinity Is., Jamaica by W. J. Fox and C. W. Johnson), Mexico (Putla, Baja California as above).

9. ENALLAGMA EISENI n. sp. Pl. xv, fig. 7.

5 ♂ **Baja Purisima, April, 1889, C. D. Haines.**
3 **San José del Cabo, not dated.**
4 **San José del Cabo, Oct., 1893, G. Eisen.**
1 **Mesa Verde, Oct., 1893, G. Eisen.**
3 **Sierra San Lazaro, Sept., 1894, Eisen & Vaslit.**
1 **San José del Cabo, Sept., 1894, Eisen & Vaslit.**

17 ♂

mid-dorsal carina usually blue; the black humeral stripe is almost as wide as the blue antehumeral stripe except at its upper end where it is narrower and connected by a black line with the mid-dorsal stripe just in front of the antealar sinus; antealar sinus, except at its anterior margin which is blue; a short stripe at the upper end of the second lateral suture and on the rest of that suture a very fine line; femora superiorly and an anterior tibial stripe; a dorsal spot on the basal half of 1; on 2 varying from a rather narrow mid-dorsal band reaching from base to apex, narrowest at the middle of the segment, with an angular dilation before the apex—to a round apical spot connected by an apical tail with the apex of the segment; 3 with a lanceolate mid-dorsal spot, pointed posteriorly, on the basal half, and a broader spot or band on the apical fourth; 4–6 similar to 3, sometimes the basal and apical spots of 6 united by a narrow line; 7 almost entirely, except a narrow, transverse, medially-interrupted, basal, blue ring, which also exists on 3–6; 8–10 blue, 8 with a minute, mid-dorsal, basal point, 10 with a narrow median stripe, black.

10 slightly excised at middle of hind, dorsal margin, a small black tubercle at each side of excision. Superior appendages longer than 10, viewed from above divergent except at apex, lamellate, obscure and pale in color except along the apical and superior margins which are black. Viewed in profile each appendage becomes slightly wider to the apex which is truncated almost at right angles with the superior margin; on the inferior margin in the basal half of the appendage is a well-developed, lamellate tooth, directed downwards; the margins of this tooth are convergent, the apical margin being the more oblique to the appendage so that the apex of the tooth is bluntly pointed. Inferior appendages pale, slender and conical in their

apical half, directed upwards, the pointed black apex reaching as far as the apical margin of the tooth of the superiors.

Wings clear. Pterostigma brown, rhomboidal, surmounting a little less than one cell. Front wings with 8–10 postcubitals, 3 discoidal cells, nodal sector rising from between fourth and fifth postcubitals to between fifth and sixth. Hind wings with 7–9 postcubitals, 3 discoidal cells, nodal sector arising at the fourth, or between the fourth and fifth postcubitals.

Abdomen 23–26. Hind wing 16–18. ♀ unknown.

An interesting peculiarity is the variation in the extent of the black marking on the second abdominal segment, both extremes of which, and some intermediate forms, are to be found in the specimens from Baja Purisima. The grouping employed by Baron de Selys for the species of *Enallagma* " black spot of the second segment in form of an [apical] T " and " black spot of the second segment a dorsal band," is therefore no longer so decisive. In addition to the form of the appendages, a specific character is to be found in the presence of the lanceolate, basal, black spot on 3–6.

ISCHNURA Charpentier.

Charp. Lib. Eur. p. 20, 1840. Selys, Bull. Ac. Belg. (2) xli, p. 258, 1876. Calvert, Trans. Am. Ent. Soc. xx, p. 221, 1893. *Micronympha* Kirby, Cat. Odon. p. 140, 1890.

Synopsis of the Western North American Species (males only).

- Inferior appendages prolonged on the outer side into a slender, cylindrical process which is not bifid, usually acute at tip and curved inwards.
  - A complete green antehumeral stripe.
    - 8–9 blue, a transverse, basal, black ring on 8, a transverse apical black spot on 9. *I. Ramburii*, var. *credula* Hag.
    - 8–9 blue, a lateral black stripe on each from base to apex, with or without a transverse, basal ring on 8 and a transverse, apical ring on 9. *I. erratica* n. sp.
  - No antehumeral stripe or spots.
    - 8–9 blue, a lateral black stripe on each from base to apex, 8 with a transverse, basal black ring. *I. exstriata* n. sp.
- Inferior appendages bifid or trifid at apex.
  - A complete pale (green or yellow) antehumeral stripe.
    - 8–9 blue, a lateral black stripe on each. *I. perparva* Selys.
    - 8–9 blue, 8 only with a lateral black stripe each side at base. *I. demorsa* Hagen.*
  - Two small spots representing the upper and lower ends respectively of antehumeral stripe.
    - 8–9 blue, a lateral black stripe on each. *I. cervula* Hagen.

The superior appendages are also characteristic, see plate xv.

10. ISCHNURA RAMBURII Selys, var. CREDULA Hagen. Pl. xv, figs. 5, 6.

Agrion credulum Hagen, Syn. Neur. N. A. p. 80, 1861. *A. defixum* Hagen *l. c.* *I. R.* Selys, Bull. Ac. Belg. (2) xli, p. 272, 1876 (adds *credula* as a synonym, but does not mention differences). Calvert, Trans. Am. Ent. Soc. xx, p. 240, 1893.

1 ♂ Comondu, not dated.
9 , 2 black ♀, 5 orange ♀, San José del Cabo, not dated.
5 , 1 black ♀, 7 orange ♀, San José del Cabo, Sept., 1893, G. Eisen.
2 orange ♀, San José del Cabo, Oct., 1893, G. Eisen.

15 ♂ 17 ♀

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* Unknown to the writer.

In the typical *Ramburii*, a common species along the eastern coast of the United States, the eighth abdominal segment is blue, the ninth black; in *credulum* "segment 8 entirely, 9 base only blue," both statements referring to males and the black females.

The above cited specimens are of variety *credula;* 8 is blue entirely or with a very narrow, transverse, basal, black ring, articulation between 8 and 9 black; 9 blue with an apical, dorsal, black spot occupying from one-third to more than one-half the length of the segment on the mid-dorsal line, but less on the sides—besides which there is in some individuals a small, mid-dorsal, basal, black spot, which may be united with the black at the apex by a narrow, or even a broad, band. Two of the black females have these basal and apical spots on 9 separated by a blue interval equal to one-fifth the length of the segment, while the remaining black female has these spots united by black. The orange females are colored as in typical *Ramburii* (having no black humeral stripe, 1 and base of 2 orange—see Calvert *l. c.*), the extent of the black on 2 is variable and on 10 varies from nothing to the entire dorsum. That all are to be referred

ISCHNURA? ERRATICA n. sp. Pl. xv, fig. 1.

1 ♂, 1 ♀ Mendocino county, California (Am. Ent. Soc. Coll.) 1 ♂ 1 ♀ Olympia, Washington, July 8, 1893. T. Kincaid (P. P. Calvert's Coll.)

♂ Black, the following blue or green: lips, head below, frons anteriorly, postocular spots, a complete antehumeral stripe each side, sides of thorax (except a superior black line on the first lateral suture and a complete line on the second), pectus, abdomen below, apical dorsal half of 1, a wavy, transverse, apical band on 2, a dorsal band on the apical five-sixths of 7, 8 and 9 (except a lateral black band on the side of each, reaching from base to apex, those of 8 united by a narrow, transverse, basal, black band and of 9 by a transverse, apical band in the Californian male, but not united on either 8 or 9 in the Washington example), feet except an anterior black stripe. A narrow, transverse, basal, interrupted, yellow ring on 3–7. Hind margin of prothorax rounded, emarginate in the middle. Forked process on 10 about half as high as 10 itself; viewed in profile, it commences near the middle of 10 at an angle of about 50°; forked in less than its apical half, branches divergent at 90° or more.

Superior appendages black, very short, one-fourth as long as 10, tubercular, with a slender, inner, inferior prolongation reaching to the base of the inferior appendages. Inferior appendages two-thirds as long as 10, similar to those of *exstriata*, but with the apical process a little more robust and curved upwards as well as inwards at the extreme tip.

Wings clear. Front wings with 9–12 postcubitals, nodal sector arising near fifth antecubital, on hind wings near the fourth. Pterostigma of front wings surmounting a little more than one cell, very oblique, nearly equilateral, bicolored, inner half blackish, outer half reddish; of the hind wings much smaller, hardly surmounting one cell, upper and outer sides longer than the other two, outer side more oblique than inner, color luteous.

♀ Differs from ♂ as follows: a transverse, basal, black stripe on labrum, 8–9 black in the Californian female, similar to those of the Washington male in the Washington female; hind margin of prothorax distinctly bilobed; a very distinct, transverse, erect, triangular lamella behind each mesostigma; no apical ventral spine or acute point to 8; appendages black, three-fourths as long as 10; front wings with 12–13 postcubitals, nodal sector arising at sixth postcubital in front wings, at fifth in hind wings, in the Californian female only; pterostigma luteous, of nearly equal size on front and hind wings, some double cells after it.

Abdomen ♂ 25, ♀ 24–26. Hind wing ♂ 18–18.5, ♀ 19–21.

To write of the female that it possesses no ventral spine to the eighth segment is almost equivalent to excluding this species from Ischnura, but it is here so referred, with much hesitation, for the following reasons:

1. As shown by the descriptions and figs. 1 and 2 pl. xv, the appendages of the males of *erratica* and *exstriata* are very similar, hence if *exstriata* be an Ischnura it is

11. ISCHNURA EXSTRIATA n. sp. Pl. xv, fig. 2.

4 ♂ San Fernando, Baja California, May, 1889, C. D. Haines (Calif. Acad. Coll.)

2 ♂ 1 ♀ San Bernadino, Cal., Feb.-March, 1892, P. C. Truman (P. P. C. Coll.)

2 ♂ Los Angeles, Cal., Dr. A. Davidson (P. P. C. Coll.)

♂ Black with a metallic lustre, the following blue or green: lips (except a transverse basal, black labral stripe), rhinarium, frons, genæ, head below, a very small isolated postocular spot each side, sides of thorax (except a short superior line on the first lateral suture and a complete line on the second), feet except an anterior black stripe, 8–9 (except a lateral black band on each, from base to apex, on 8 those of right and left sides united by a transverse black band occupying the basal half to third of the dorsum of the segment). A transverse, basal, interrupted, yellow ring on 4–7. Forked elevation on 10 not more than half as high as 10; viewed in profile it commences at the base and rises at an angle of about 20°–25°; forked in less than its apical half; branches divergent at less than 90°.

Superior appendages very short, one-fourth as long as 10, tubercular, with an inferior apical process. Inferior appendages nearly half as long as 10, yellowish except at tip, rather broad at base, then narrowed and prolonged on the outer side as a slender process, which is cylindrical, not flattened, apex acute, curved inwards (similar to the same appendages of *I. Rambursii* and *verticallis*).

Wings clear. Front wings with 7–9 postcubitals. Nodal sector arising near the fourth postcubital on front wings, near third on hind wings. Pterostigma on front wings, surmounting less than one cell, longer than wide, outer side straight; blackish, upper outer corner pale; on hind wings smaller, gray.

♀ Differs from the ♂ as follows: luteous replacing blue;

postocular spots confluent behind with yellow of rear of head; a complete, luteous, antehumeral stripe leaving a much narrower black humeral stripe, lateral thoracic sutures each with merely a short, superior, black line; 1–2 and 8–9 black, articulations of 1–2, 7–8, 8–9 yellowish; abdomen beneath and valvules luteous; appendages blackish, half as long as 10; apical ventral spine on 8 distinct but small; pterostigma similar on all the wings, pale luteous, some double cells beyond it on the hind wings.

Abdomen ♂ 17.5–20, ♀ 21.5. Hind wing ♂ 12–13.5, ♀ 15.5.

It is not certain that this female is of the same species as the males, but it was the only Agrionine female, other than *Argia vivida*, received from Mr. Truman, and the two males of *exstriata* were the only Agrionine males (other than *Argia vivida*) received from him.

ISCHNURA PERPARVA (McLachlan MS.) Selys. Pl. xv, fig. 4.

I. p. Selys, Bull. Ac. Belg. (2) xli, p. 263, 1876. *I. defixa* Selys, *l. c.*, p. 261.

half shorter and much smaller on the inferiors. A narrow, yellow, antehumeral stripe. Abdominal segments 8 and 9 clear blue with a lateral black ray, not touching the apex, very short on 9. Superior appendages half shorter than the last segment, thick, truncated at the apex which is bent downwards. Inferior appendages flattened like a goose's foot, forming three [*] points, one external and superior, one internal and subbasal, and one median, slender, longer and curved inwards.

The differences between *defixa* and *perparva* are then stated to be—

I. perparva Selys ♂.	*I. defixa* Selys (not Hagen).
1. Abd. 17-18. Hind wing 11-12	A little larger, ab. 21-22, h. w. 13-14.
2. Pterostigma pale, a little reddish	of front wings deep black, of hind wings gray
3. Femora with an obscure, external line ill defined or maculate	with a broad black band externally
4. Forked process on 10, viewed in profile, rising from base of 10	rising from the second half of 10
5. Appendages yellow	a little obscure
6. Sup. app. with a small tooth at the base internally	internal basal branch more distinct
Habitat. California.[†]	Northern California.

Baron de Selys remarks (*l. c.* p. 262) that it is possible that his *defixa* " may be only a larger race or variety of *perparva*, and that the difference in the color of the pterostigma of the superiors and of the feet may result from the specimens of *defixa* being very adult, while those of *perparva* may be newly transformed......It is probable that this species [*i. e. defixa* Selys] is the *defixum* of Dr. Hagen. I dare not refer it there with certainty because I have not seen the specimen, and because in his correspondence Dr. Hagen thinks that his species cannot be maintained. After that I had at first named it *I. furcula*."

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[*] The presence or absence of the third or median point appears to be a variable character not of specific value.

[†] Given as "Texas occidental" in the description cited, corrected to California by McLachlan, Zool. Record for 1876.

The evidence here presented to prove *defixa* Selys not distinct from *perparva* aims to show that the differences above tabulated are not constant. Two males from California ab. 19–20, h. w. 12.5–13, agree with 2, 3, 4 and 5 of *defixa*, have only the merest trace of an internal basal tooth to the superior appendages, have the right inferior appendage bifid, the left trifid. Two other males from California and one male from Olympia, Washington, ab. 20–22, h. w. 12.5–13.5, agree with 2, 3, 4 and 5 of *defixa*, have both inferior appendages bifid, black stripes of right and left sides of 8 connected by a transverse basal ring; in the Washington male the upper outer point of the left inferior appendage is itself bifid. One male from southern Texas, ab. 19.5, h. w. 12.5, agrees with *defixa*, the black lateral stripes on 9 reach the apex. One male from Denver, Colorado, ab. 20.5, h. w. 12.5, agrees with 2, 5 and 6 of *perparva*, 3 and 4 of *defixa*, to be " two-branched, external branch conical, straight, internal branch longer flat," a form of appendage quite different from that described for *perparva* by de Selys. The inferior appendages of *defixum* are " unguiculated, longer, oblique, recurved," an expression similar to that employed for *Ramburii* (p. 76) and therefore hardly likely to have been applied to such a trifid or bifid appendage as exists in *perparva.*

3. Lastly it is believed that a comparison of Hagen's original descriptions of *defixum* and *credulum*, justifies the assertion that both apply to the same insect, since it has been shown under *Ischnura Ramburii* var. *credula* (see *ante* in this paper) that the extent of the black on 8 and 9 is a variable quantity. Since *credulum* is recognized as not specifically distinct from *Ramburii* Selys (*iners* Hagen, 1861), *defixum* Hagen must also be referred there.

Distribution of *perparva* Selys (*defixa* Selys). California, Washington (Olympia, June 4, 1893, by Mr. Trevor Kincaid), Colorado (Denver, by Mr. E. V. Beales), Texas (Mr. S. F. Aaron). (Collections of Amer. Ent. Soc. and P. P. Calvert).

12. ISCHNURA CERVULA Selys. Pl. xv, fig. 3.

l. c. **Selys, Bull. Ac. Belg. (2) xli, p. 262, 1876.**

1 ♂ Comondu, Baja California, March, 1889, C. D. Haines.
2 ♂ 1 ♀ San Ignacio, Baja California, April, 1889, C. D. Haines.
4 ♂ 1 ♀ California (Calif. Acad. coll.)
1 ♂ Mendocino Co., Calif. (Am. Ent. Soc. coll.)

♂ Black with a metallic lustre, the following blue or green: lips, except a transverse, basal, black, labral stripe; rhinarium, frons, genæ, head beneath, a very small, isolated postocular spot each side; two small spots on each side of thoracic dorsum, representing respectively the upper and lower ends of an antehumeral stripe; sides of thorax, except a short superior black line on the first lateral suture and a complete black line on the second; feet, except an anterior black stripe; 8 and 9, except a short lateral band each side not reaching the apex of the segments. A transverse, interrupted, basal, yellow ring on 4–7.

Forked elevation on 10 half as high as 10 itself; viewed in profile it commences at the base and rises at an angle of about 50°; forked in at least its apical half, branches divergent at an angle of less than 90°, extreme tips turned outwards. Superior appendages extremely small, about one-third as long as 10, tubercular, with a long, slender, acutely pointed, inferior process. Inferior appendages nearly as long as 10, directed upwards, apical half black, flattened, apex emarginated in a shallow curve forming two tips, outer tip barely longer but projecting farther backwards and outwards.

Wings clear. Pterostigma nearly equilateral, all four sides slightly convex, black on front wings with a pale line along the edges; dark gray on the hind wings with a similar pale line, and only slightly smaller in size; in

Subfamily GOMPHINÆ.

PROGOMPHUS Selys.

Selys, Bull. Ac. Brux. xxi (2), p. 69, 1854. Monog. Gomph. p. 194, 1857.

13. PROGOMPHUS OBSCURUS Rambur. Pl. xvi, figs. 74-79.

Diastatomma o. Ramb. Ins. Nevr. p. 170. *P. o.* Selys, Bull. Ac. Brux. xxi (2), p. 72, 1854; (2) xlvi, p. 658 (1878); Monog. Gomph. p. 201, 1857. Hagen, Syn. Neur. N. A. p. 110, 1861; Proc. Bost. Soc. N. H. xviii, p. 48, 1875. *Progomphus borealis* (McLachlan) Selys, Bull. Ac. Belg. (2) xxxv, p. 764, 1873. Hagen, Proc. Bost. Soc. N. H. p. 356, 1874; xviii, p. 48, 1875.

1 ♂		San Luis, April, 1889, C. D. Haines.
1		Sierra El Taste, Sept., 1893, G. Eisen.
2		San José del Cabo, Sept., 1893, G. Eisen.
1	4 ♀	San José del Cabo, Oct., 1893, G. Eisen.
	1	San José del Cabo, not dated.
2	1	(♀ just transformed) Miraflores, Sept., 1894, Eisen & Vaslit.
7 ♂	6 ♀	

A comparison of all the present material with the descriptions of de Selys, 1873, and Hagen, 1874, follows:

♂ Frons olive, its superior, transverse, brown band in front of the ocelli produced but little or not at all in the middle. Nasus paler than the frons, yellowish-green, obscure in the middle, rhinarium still paler, lips colored nearly as nasus. Vertex brown, behind the two posterior ocelli is a greenish area not reaching the occiput however. Hind margin of occiput very slightly convex. Two yellow spots behind each eye, in some cases confluent. Inferior "humeral" stripe or line (really antehumeral, thus making two antehumeral stripes) present or absent; in the former case united with a spot above, in the latter case there are merely the two "superior yellow spots" which are, strictly speaking, one ante-, the other posthumeral. As compared with Mon. Gomph. p. 202, the yellow antehumeral bands unite with the yellow of the anterior mesothoracic border. Sides of thorax, in fresh alcoholic specimens, bluish, becoming brownish when dried; second lateral suture with a brown stripe. Abdomen: the "dorsal spear-shaped" fascia not reaching the apex of 3; 8 with a small, triangular, yellow spot each side at base of dorsum, and on each lateral surface a basal and a smaller apical spot; a small, yellow, apical spot on each side of 9; a yellow streak on the middle of the inferior lateral margin of 3–7.

In none of the descriptions of the superior appendages (which are about twice as long as 10) is mention made of a longitudinal carina on the outer margin of the inferior surface, extending from the base to not quite as far as the middle of the appendage; this carina is finely denticulated, its course is convex exteriorly when viewed from below. A similar carina is shown for *P. complicatus* and *P. costalis* in Pl. 11, Monog. Gomph. On the inner edge of the branches of the inferior appendage are two to four small, superior teeth immediately before the apex.

Femora above reddish-brown, yellowish below, tibiæ blackish, knees yellow. The first tibiæ have a pale in-

(in reality antehumeral) stripe present, which may, as in one female, unite above with the superior spot; lateral basal and apical yellow spots on 8 confluent in two females; apical, lateral spot on 9 larger; streak on middle of inferior, lateral margin of 3–7 greenish rather than yellowish; dorsum of 10 mostly yellow, basal third or fourth brown. Appendages about twice as long as 10, yellow, sharply pointed, extreme tip black in three females; de Selys' description of 1878 speaks of these appendages as. "as long as 10." No inferior carina to first tibiæ. Brown spot at base of wings reaching to basal subcostal cross-vein. Vulvar lamina more than one-third as long as 9 on the sides, about one-fourth as long at the middle, with a rounded median emargination extending almost to the base of the lamina, and a shallower emargination on each side, making three in all.

♂ ♀ Triangle of front wings with upper and inner sides of equal length in at least 2 ♂ 1 ♀, divided into three cells by three veins which meet in the center; internal triangle 2-celled by a vein parallel to its upper side,* 3-celled in one wing of 1 ♀. Hind wings with upper side of triangle longer than inner side, triangle 3-celled as in front wings (4-celled in 1 ♀, 2-celled in 2 ♀, asymmetrical—2 right, 3 left—in 1 ♂); internal triangle 2-celled by a vein parallel to its outer side,* or free in 5 ♂ 1 ♀. A basal subcostal cross-vein (Karsch) present on all the wings, or absent in one hind wing in 2 ♀, or in both hind wings 2 ♂ 1 ♀, or on all the wings 1 ♀. Three or four post-triangular cells, then two rows on all the wings. No coloring at the arculus, the sectors of which are always separate at their origin. Front wings with 14–16 antecubitals, first and fifth (sixth or seventh in 1 ♂ 1 ♀)

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*In both front and hind wings the vein dividing the internal triangle into two cells is transverse to the greatest dimension of the triangle.

thicker, 7–9 postcubitals. Hind wings with 9–11 antecubitals, first and fifth thicker, 7–10 postcubitals. Abd. ♂ 42.5–45, ♀ 41–45. Hind wing ♂ 30–33, ♀ 33–34.5. Total length ♂ 56–60, ♀ 55–60. Pterostigma ♂ 4–5, ♀ 4.5–5.

Distribution. Mexico (Baja California as above), California (Los Angeles by Dr. A. Davidson, P. P. Calvert's coll.), Oregon, Texas, Georgia, Massachusetts (Boston).

OCTOGOMPHUS Selys.

Selys, Bull. Ac. Belg. (2) xxxv, p. 759, 1873.

14. OCTOGOMPHUS SPECULARIS (Hagen) Selys. Pl. xvi, figs. 80–84.

Neogomphus? s. **(Hagen) Selys *l. c.* (2) vii, p. 544, 1859. Hagen, Syn. Neur. N. A. p. 110, 1861. *O. s.* Selys *l. c.* (2) xxxv, p. 760, 1873. Hagen, Proc. Bost. Soc. N. H. xviii, p. 44, 1875.**

1 ♀ Comondu, not dated.

Distribution. Mexico (Baja California as above), California.

Subfamily ÆSCHNINÆ.

ÆSCHNA Fabricius.

(*Æshna*) Fabr. Syst. Ent. p. 424, 1775. Karsch, Ent. Nach. xvii,

Margins of superior appendages not entire.

5. Sup. app. when viewed in profile with apex distinctly forked, inferior branch shorter; 10 with dorsal teeth. *multicolor* Hagen.

6. Sup. app. when viewed in profile not forked at apex which is rounded and bears an acute, inferior, anteapical spine; no dorsal teeth on 10. *constricta* Say.

ÆSCHNA JUNCEA Linné, var. VERTICALIS Hagen.

Æ. v. Hagen, Syn. Neur. N. A. p. 122, 1861; Proc. Bost. Soc. N. H. xviii, p. 34, 1875. Calvert, Trans. Am. Ent. Soc. xx, p. 248, 1893. *Æ. clepsydra* Walsh, Proc. Acad. Phila. 1862, p. 397. *Æ. propinqua* Scudder, Proc. Bost. Soc. N. H. x, p. 214, 1866 (in part).

One male, California.

Distribution. Nova Scotia to the District of Columbia, Illinois, California.

15. ÆSCHNA LUTEIPENNIS Burmeister. Pl. xv, figs. 27–28.

Æ. l. Burm. Handb. Ent. ii, p. 837, 1839. Hagen, Proc. Bost. Soc. N. H. xviii, p. 39, 1875. *Æ. excisa* Brauer, Verh. zool. bot. Ges. Wien, xv, p. 906, 1865; Reise d. Novara, Neur. p. 69, pl. i, fig. 19, 1866. Hagen, Verhd. zool. bot. Ges. Wien, xvii, p. 50, 1867.

1 ♂ Mesa Verde, Oct. 1893, G. Eisen.
1 San José del Cabo, Oct., 1893, G. Eisen.
1 Miraflores, Sept., 1894, Eisen & Vaslit.

From the careful description of *excisa* Brauer (synonymous with *luteipennis* according to Hagen), these three males differ as follows: labium bluish instead of yellowish; suture between the eyes much more than double as long as the occiput, being nearly as long as the combined length of frons and vertex, measured along the mid-dorsal longitudinal line; first femora blue inferiorly: mid-dorsal, longitudinal, abdominal stripe blue instead of yellow; 9 with a mid-dorsal, apical, triangular, blue spot, a similar smaller one on 10 in the males from Mesa Verde and Miraflores; superior appendages a little longer than 9–10; costa with a yellowish line to the nodus.

Front wings with discoidal triangle of four cells (three in right front wing of two males); internal triangle of two cells (one small and inferior, the other much larger and superior) in the male from Mesa Verde, of one cell in the other two males; 5 median cross-veins (4 in one wing of two ♂), 3 supratriangulars (4 in one wing San José ♂); 19–21 antecubitals, 1st and 7th (9th in one wing San José ♂) thicker, 11-13 postcubitals.

Hind wings with discoidal triangle 3-celled (Mesa Verde) or 4-celled (S. J., M.), internal triangle free, 3 median cross-veins, 3 supratriangulars (2 in one wing Mesa Verde ♂), anal triangle 2-celled, 13–14 antecubitals, 1st and 7th thicker, 12-15 postcubitals.

Abdomen 62.5–64, hind wing 48, total length 83, sup. app. 6, pterostigma 4.5.

Distribution. Mexico (Baja California as above), Brazil (San Leopoldo).

ÆSCHNA CALIFORNICA (Hagen MS.) n. sp. Pl. xv, figs. 19, 20, 23.

Æ. c. Hagen, Proc. Bost. Soc. N. H. xviii, p. 33, 1875 (no description).

anterior notch, yellow; occiput yellow, hind margin straight; rear of eyes black.

Thorax pale brown or luteous (?), sides with two oblique pale bluish stripes margined with black inferiorly, humeral and second lateral sutures marked with black lines. Legs blackish, reddish-brown at bases.

Abdomen moderately swollen at the base, constricted at 3, of nearly uniform width from 4–10, brown, marked with blue or green as follows: apical half of 2; an apical spot each side of 3–10, not confluent; base of 3–7 with a transverse band, represented by a small basal spot each side of 8; a transverse median band on 3–7, interrupted by the mid-dorsal carina; a lateral spot behind the median transverse suture on 3–8, and which may become confluent with some of the other spots. Sternum of 1 with the denticles (frequently to be found on this place in various species of Æschna) situated on the summit of a small tubercle. Auricles of 2 with two teeth. Segment 10 with a basal mid-dorsal keel-like tooth and two parallel, lesser ones each side.

Superior appendages as long as 9+10, curved somewhat inwards and widened more or less gradually on the inner side in the apical half, concave below, above with a median, longitudinal carina which becomes quite sharp and more elevated in the apical fourth, but is not denticulated; margins entire, apex truncated to form an angle of a little more than 90°. Viewed in profile, the basal fourth is directed downwards and a very slight inferior projection marks a change of direction to the horizontal, while the apical fourth slopes slightly upwards. Inferior appendage a little less than half as long, triangular, apex rounded, very slightly notched.

♀ Differs from the ♂ as follows: a small, narrow, isolated antehumeral, yellow spot on thoracic dorsum, stripes on sides of thorax yellow, a little wider. Abdomen shaped as in ♂, a blue apical spot on each side of 2 instead of the apical half; base of 3–6 with the transverse band, on 7–8 represented by a small basal spot each side. Sternum of 1 with a similar and equally well developed tubercle with the apex spinous. No teeth on 10. Apical part of the appendages broken off. Genital valvules reaching only to apex of 9. Apical margin of 10 with many small denticles.

♂ ♀ Wings clear. Costa yellowish to somewhat beyond the nodus, other veins mostly brown. Pterostigma dark brown (♂) or paler (♀), surmounting 2½–3 cells. Membranule white, apical third cinereous. 2 supra-triangulars (1 in left hind wing of ♀), at most three rows of cells between subnodal sector and supplementary sector next below; discoidal triangle 4-celled (3 in one wing 1 ♂, 5 in one wing 1 ♂), two on the inner (basal) side. Front wings with 11–15 antecubitals, 1st and 5th (6th in 1 ♂) thicker, 8–11 postcubitals, internal triangle free (with one cross-vein in 1 ♂), 3 (4 in one wing 1 ♂) other median cross-veins. Hind wings with anal triangle of ♂

ing a distinct, inferior, subbasal tooth, the pterostigma shorter and yellow, the reticulation of the wings more yellowish. Two other South American species described by Rambur, *bonariensis* and *Marchali*, are personally unknown to the writer; perhaps they are closely allied, but Rambur's descriptions seem to indicate specific differences from *californica*. In describing *californica* as new, reliance has chiefly been placed upon the facts that Dr. Hagen considered the species as distinct, that the allied species referred to above were known to him, and that the present writer possesses one of Dr. Hagen's types given by him in July, 1890.

16. ÆSCHNA CORNIGERA Brauer. Pl. xv, figs. 24, 31, 32.

Æ. c. Brauer, Verh. zool. bot. Ges. Wien, xv, p. 906, 1865; Reise d. Novara, Neur. p. 70, pl. i, fig. 16, 1866. Hagen, Verh. Zool. Bot. Ges. Wien, xvii, p. 49, 1867; Proc. Bost. Soc. N. H. xviii, p. 39, 1875. *Æ. jucunda* Hagen, Syn. Neur. N. A. p. 314, 1861 (no description).

1 ♂ 1 ♀ El Paraiso.
1 San Raymundo, April, 1889, C. D. Haines.
1 Mesa Verde, October, 1893, G. Eisen.

Differs from Brauer's description in wanting the black line on the fronto-nasal suture, by having a larger pterostigma (2 mm. in Brauer's specimens), and the (blue) thoracic stripes narrower. Hagen *(l. c.* 1867) mentions that "die Flugelspitzen der Männchen sind oft hyalin ohne Bräunung"; such is the case in all four of these specimens.

Sternum of 1 with a spinous tubercle as in *californica*, but more prominent. Superior appendages of the male with the apex terminating in a short, acute process directed downwards, the superior, median, longitudinal carina relatively less elevated before the apex than in *californica*, no inferior, subbasal projection. Tenth segment of the male with but one lesser tooth each side of the mid-dorsal one. Appendages of female broken.

Front wings with 3 (2 in one wing of 1 ♂, one wing of ♀) supratriangulars, discoidal triangle of 5 cells (4 in one wing of 2 ♂), two on the basal side; 16–19 antecubitals, the 1st and 5th, 6th or 7th thicker; 10–13 postcubitals; internal triangle with one cross-vein, 4 (5 in one wing of 2 ♂) other median cross-veins.

Hind wings with 2 (3 in 1 ♂) supratriangulars, discoidal triangle of four cells, two on the inner (basal) side, 9–10 antecubitals, 1st and 5th (6th in one wing 1 ♂) thicker, 11–14 postcubitals, internal triangle with one cross-vein, three (4 in one wing of ♀) other median cross-veins, anal triangle of male 3-celled.

Total length ♂ 64, ♀ (excl. app.) 65. Abd. ♂ (incl. app.) 48, ♀ (excl. app.) 47. Sup. app. ♂ 5.5. Front wing ♂ 44–45, ♀ 49. Hind wing ♂ 43–44, ♀ 48. Pter. 3–3.5.

Distribution. U. S. Colombia, Venezuela (Porto Cabello), Brazil (New Friburg, S. Leopoldo), Uruguay (Montevideo), Mexico (Baja California, as above).

17. ÆSCHNA MULTICOLOR Hagen. Pl. XV, figs. 25,

♂ Anal triangle 3-celled; 10 with a small, median, basal, dorsal tooth and a smaller one on each side.

Abdomen ♂ 47–51, ♀ 49. Hind wing ♂ 43–47, ♀ 45–47.

Distribution. Mexico (Cordova, Baja California as above), California (Los Angeles, by Dr. A. Davidson), Texas, Dakota (Beadle Co., July, 1888, by Mr. E. S. Cheney), Colorado (Denver, by Mr. E. V. Beales), Yellowstone, British Columbia (Victoria).

18. ÆSCHNA CONSTRICTA Say. Pl. xv, figs. 29, 30.

Æ. c. **Say, Jour. etc. Phila. viii, p. 11, 1839. Complete bibliography, by Hagen, Proc. Bost. Soc. N. H. xviii, p. 34, 1875. Calvert, Trans. Am. Ent. Soc. xx, p. 249, 1893.**

17 ♂ La Chuparosa, October, 1893, G. Eisen.

All the pale markings of the body blue, spots at the apices of the abdominal segments quite large, a black line on the fronto-nasal suture, antehumeral stripes distinct, front wings with 19–23 antecubitals, the acute, inferior, anteapical spine of the superior appendages of the male shorter than in specimens from the eastern United States.

Abdomen 51.5–58. Hind wing 45–50.

Distribution. Baja California (as above) to British Columbia; Colorado to Maryland and Labrador; Kamtschatka, Siberia.

ANAX Leach.

Leach, Edinb. Encyc. ix, p. 137, 1815; Amer. edit. (Phila.) viii, pt. 2, p. 726, 1816. Karsch, Ent. Nach. xvii, p. 287, 1891. Calvert, Trans. Am. Ent. Soc. xx, p. 222, 1893.

(The two following species may easily be separated by size, the ♂ superior appendages, etc.)

19. ANAX JUNIUS Drury. Pl. xv, figs. 15, 16.

Libellula j. **Drury, Ill. Exot. Ins. i, p. 112, pl. 47, fig. 5, 1770. Complete bibliography in Hagen, Psyche, v, p. 305, 1890. Calvert, Trans. Am. Ent. Soc. xx, p. 249, 1893.**

	1♀	San Raymundo, April, 1889, C. D. Haines.
3♂	1	Sierra El Taste, September, 1893, G. Eisen.
11	4	San José del Cabo, September, 1893, G. Eisen.
50	27	San José del Cabo, October, 1893, G. Eisen.
11	2	Mesa Verde, October, 1893, G. Eisen.
1		Sierra Laguna, 2000 feet, October, 1893, G. Eisen.
2		Miraflores, September, 1894, Eisen & Vaslit.
1		Sierra San Lazaro, September, 1894, Eisen & Vaslit.
3	2	San José del Cabo, September, 1894, Eisen & Vaslit.
82♂	37♀	

Of 111 specimens, only 3 have more than one marginal cell between the upper sector of the triangle* and the external branch of the lower sector on the hind wings (see characters of the genera, *ante)*, viz.: 1 ♂ and the left wing only of another ♂ have two marginal cells, while the third ♂ has 3 marginal cells on the right wing, 4 on the left. However, specimens are not rare in which two rows of cells exist between the two veins mentioned to within two cells of the margin.

Front wings with discoidal triangle 3–7-celled (usually 6), 4–6 median cross-veins not forming an internal triangle, 1–4 supratriangulars, first and fifth, sixth, seventh or eighth antecubitals thicker. Hind wing with discoidal

A. W. McLach., Ent. Mo. Mag. xx, pp. 127, 171, 1883. Hagen, Psyche, v, p. 306, 1890. *A. validus* Hagen, Proc. Bost. Soc. N. H. xviii, p. 32, 1875. Cabot, Mem. Mus. C. Z. viii, p. 15, 1881.

2 ♂		El Paraiso, undated.
1		San Raymundo, April, 1889, C. D. Haines.
3		Sierra El Taste, September, 1893, G. Eisen.
5		Coral de Piedras, Cape Rey, September, 1893, G. Eisen.
1	1 ♀	San José del Cabo, September, G. Eisen.
14	4	San José del Cabo, October, 1893, G. Eisen.
3		Mesa Verde, October, 1893, G. Eisen.
2	1	Miraflores, September, 1894, Eisen & Vaslit.
	1	San José del Cabo, September, 1894, Eisen & Vaslit.
31 ♂	7 ♀	

Differs from Hagen's description of 1890 *(l. c.)*, as follows: occiput pale blue; eyes above greenish-blue, below yellowish-green; the fine black line bordering the frons anteriorly often absent; thorax probably blue in life; the dorsal black or dark brown abdominal band begins on segment 3 instead of 5; pale markings of the abdomen of the female green instead of blue; basal spots on 8–9 blue, sometimes absent on 9; 10 reddish-brown with a small blue spot each side.

Front wings with discoidal triangle 3–7-celled, 4–6 median cross-veins, not forming an internal triangle, 2–3 supratriangulars, first and sixth or seventh antecubitals thicker. Hind wings with discoidal triangle 3–5-celled, 3–5 median cross-veins, not forming an internal triangle, 1–2 supratriangulars, first and fifth, sixth or seventh antecubitals thicker.

Total length ♂ 105–115, ♀ 88–96. Abdomen ♂ 77–90, ♀ 67–73. Hind wing ♂ 56–62, ♀ 56.

Distribution. Baja California (as above), California, Arizona, Guatemala.

Subfamily LIBELLULINÆ.

PANTALA Hagen.

Hagen, Syn. Neur. N. A. p. 141, 1861. Kirby, Trans. Zool. Soc. Lond. xii, p. 265, 1889. Calvert, Trans. Am. Ent. Soc. xx, p. 223, 1893.

21. PANTALA FLAVESCENS Fabricius. Pl. xvii, figs. 92–94.

Libellula f. Fabr. Ent. Syst. Supp. p. 285, 1798. *P. f.* Bibliography in Hagen, Proc. Bost. Soc. N. H. xviii, p. 63, 1875. Calvert *l. c.* p. 254, 1893.

3 ♂	1 ♀	Sierra El Taste, September, 1893, G. Eisen.
12	1	San José del Cabo, October, 1893, G. Eisen.
2		Mesa Verde, October, 1893, G. Eisen.
17 ♂	2 ♀	

Distinguished from *P. hymenæa* by its general yellowish color and the absence of a dark brown spot near the anal angle of the hind wings, as well as by a relative difference in the lengths of the superior and inferior appendages of the males (cf. figs. 90 and 92, pl. xvii).

Distribution. Tropical parts of Old and New Hemispheres, occasional in the United States as far north as Massachusetts and Wisconsin (details in Hagen or Cal-

Distribution. Mexico (Matamoras, Mazatlan, Baja California, as above), New Mexico, Kansas (Banks), Texas, Cuba, South Dakota, Illinois, Indiana, Pennsylvania.

TRAMEA Hagen.

Hagen, Syn. Neur. N. A. p. 143, 1861. Kirby, Trans. Zool. Soc. Lond. xii, p. 268, 1889. Calvert, Trans. Am. Ent. Soc. xx, p. 223, 1893.

23. TRAMEA ONUSTA Hagen. Pl. xvii, figs. 85–87.

T. o. Hagen, Syn. Neur. N. A. p. 144, 1861; Stet. Ent. Zeit. xxviii, p. 222, 1867; Proc. Bost. Soc. N. H. xviii, p. 65, 1875.

2 ♂		San José del Cabo, May, 1893.
3		San José del Cabo, September, 1893, G. Eisen.
10	2 ♀	San José del Cabo, October, 1893, G. Eisen.
3		Mesa Verde, October, 1893, G. Eisen.
1		Sierra El Taste, September, 1893, G. Eisen.
3	1	Miraflores, September, 1894, Eisen & Vaslit.
3		San José del Cabo, September, 1894, Eisen & Vaslit.
25 ♂	3 ♀	

Basal fourth of hind wing brown veined with yellow, a clear spot on the anal margin.

♂ Superior appendages a little longer than 9 + 10. Genital hamule projecting distinctly farther than the genital lobe.

♀ Vulvar lamina as long as 9, bilobed in its apical three-fourths.

Of the specific characters assigned to this species by Hagen (*l. c.*, 1861) some are not constant, viz., the fuscous basal spot of the hind wings often attains the front margin, as it does in all the above specimens; the inferior appendage of the male, instead of just reaching to the denticulated portion of the superiors, may extend beyond it, as in *T. carolina.* Front wings with 11–13 antecubitals, 8–10 postcubitals. Hind wings with 7–8 antecubitals, 11–12 postcubitals. Total length ♂ 46–48,

♀ 47. Abd. ♂ 30–32, ♀ 33. Hind wing ♂ 38–42, ♀ 42. Pter. front wings 3, hind wings 2 mm. Sup. app. ♂ 5.5; app. ♀ 4.

Distribution. Mexico (Baja California, as above, Matamoras, Mazatlan), Panama, Texas, Florida, West Indies.

24. TRAMEA LONGICAUDA Brauer? var. Pl. xvii, figs. 88, 89.

T. l. **Brauer, Verh. Zool. Bot. Ges. Wien, xvii, p. 812, 1867.**

2 ♂ San José del Cabo, one May, the other October, 1893.

Labrum black in the middle, brownish each side; labium brownish-yellow, middle lobe only black; epistoma brown; frons superiorly and vertex with a metallic blue reflection. Thorax light brown, a black spot on the lower parts of the mesepimeron and of the metepimeron, and a black line on the upper ends of the humeral and second lateral sutures. Abdomen (probably reddish-) brown, 8–10 blackish dorsally.

Superior appendages reddish-brown, 3.5 mm. long and hence longer than 9+10 (2 mm.) but not as long as 8+9+10 (4.5 mm.), with an inferior row of about ten denticles on the basal half. Inferior appendage half as long

3–6 cells wide, from the membranule to the anal angle. Front wings with four rows of post-triangular cells, 12–13 antecubitals, 10–11 postcubitals. Pterostigma ochre- or reddish-yellow, 3 mm. long in front wings, 2 mm. long in hind wings.

Total length 48. Abd. 32. Hind wing 44 mm.

Dr. Brauer has characterized *(l. c.*, p. 811) the group of *T. cophysa* Hag. as having "four discoidal [post-triangular] rows, basal spot of the hind wings reaching only to the cross-vein of the middle cell" (= median cross-vein). This group is divided into two sections, the first with the anal margin of the hind wings entirely or partly hyaline, the second with the anal margin black; *longicauda* is referred to the first section. From the sufficiently described species of this first section, the two above males differ as follows:

Cophysa Hagen has a large quadrangular dark brown spot on the thoracic dorsum, and two, oblique, yellow bands on the sides of the thorax.

Subbinotata Brauer has the hamule not projecting beyond the genital lobe, the sup. app. ♂ as long as 8 + 9 + 10, inf. app. one-third as long as sup. app., pterostigma longer (3 mm.) on hind wings.

Longicauda Brauer has the sup. app. ♂ as long as 8 + 9 + 10, the general color of the body and of the basal spot on the hind wings is blackish-brown. These two males may not belong to *longicauda*, but it seems best to refer them here provisionally. *Longicauda* inhabits Brazil.

Insularis Hagen has merely a small hyaline spot on the anal margin of the hind wings, the hamule does not project beyond the genital lobe, the sup. app. ♂ are as long as 8 + 9 + 10.

The Mexican and West Indian species *abdominalis* Rambur which may be considered to belong to the second section of this group, although the color of the anal margin is dark brown, not black, also differs by the frons superiorly and vertex red, the pterostigma brownish-black or reddish-brown.

LIBELLULA Linné.

Linné, Syst. Nat. i, p. 543, 1758. Hagen, Syn. Neur. N. A. p. 150, 1861 (in part). Calvert, Trans. Am. Ent. Soc. xx, p. 224, 1893. *Leptetrum*, *Belonia*, *Holotania* Kirby, Trans. Zool. Soc. Lond. xii, pp. 286, 288, 1889.

25. LIBELLULA SATURATA Uhler. Pl. xvi, figs. 70–73.

L. s. Uhler, Proc. Ac. N. S. Phila. 1857, p. 88. Hagen, Syn. Neur. N. A. p. 152, 1861. Rep. U. S. Geol. Sur. Terr. 1873, p. 586, 1874; Stett. Ent. Zeit., xxviii, p. 92; Proc. Bost. Soc. N. H. xviii, p. 70, 1875. *Belonia s.* Kirby, Cat. Odon. p. 28, 1890. *L. croceipennis* Selys, Ann. Soc. Ent. Belg. xi, C. R. p. lxvii, 1868. Hagen, Rep. U. S. Geol. Sur. Terr. 1873, p. 586. Proc. Bost. Soc. N. H. xviii, p, 70, 1875. *Belonia c.* Kirby, Cat. Odon. p. 28, 1890.

9 ♂	2 ♀	San Ignacio, not dated.
3		San José del Cabo, not dated.
11		San José del Cabo, September, 1893, G. Eisen.
32	3	San José del Cabo, October, 1893, G. Eisen.
14		Miraflores, September, 1894, Eisen & Vaslit.
10		San José del Cabo, September, 1894, Eisen & Vaslit.

Croceipennis is said to be smaller, but to have a longer pterostigma; measurements are not given. The expression used by Dr. Hagen for *saturata*, "hamules with inner and outer branches equally pointed," is misleading, as the inner branch in both forms is always longer and more acute; in otherwise typical *croceipennis* the inner branch is more slender and its extreme hook-like apex is somewhat more prolonged than in otherwise typical *saturata*, but after an examination of the above material, it seems impossible to establish any specific difference. The difference in the size of the genital lobe is mainly in width; in males with typical *saturata* wings the greatest width is less than the length; in typical *croceipennis* the width exceeds the length.

The specimens from San Ignacio agree mainly with *saturata* in wing-coloring, but the intensity of the coloring of the median space and triangle of the hind wings varies; the genital lobe is like *saturata*. Abd. ♂ 32–33, ♀ 30–32. Hind wing ♂ 38–40, ♀ 40–42.

The fourteen males from San José del Cabo (not dated and September, 1893) mostly agree with *croceipennis*. The yellowish-brown on the front wings extends from the base to the triangle or to the nodus, on the hind wings its apical limit varies from the triangle to beyond the nodus. In one male the median space in the hind wings is fuscous, but not the triangle; this male has the genital lobe narrower than its fellows. The amount of coloring of the wings is not correlated with size. Abd. 29–32.5, hind wing 35–41. Pter. 5.5–5.

Of the thirty-five individuals taken at San José del Cabo in October, 1893, twenty-five, all males, have the wings reddish-brown from base to nodus for almost the entire width of the wing; of these twenty-five, some have no fuscous in the triangle and median space, others a varying amount of fuscous therein. The seven remaining males have the reddish-brown extending to the triangles. The three females have the wings reddish-brown to nodus but more marked along costal margin, median space and triangle of hind wings darker brown.

The difference above numbered 2 is valueless as a male from Los Angeles, Cal., otherwise agreeing with *saturata*, has these veins red.

Too many intermediate forms thus appear to exist to allow of *saturata* and *croceipennis* being considered as distinct.

The body and especially the abdomen of this species is brilliant red in color.

Distribution. Mexico (Baja California, as above, to which Hagen adds Cape San Lucas, Tampico, Cordova, Orizaba, Vera Cruz, Tehuantepec), Guatemala, Colombia?, California (Los Angeles by Dr. A. Davidson), Arizona, Montana, Yellowstone.

PSEUDOLEON Kirby.

Kirby, Trans. Zool. Soc. Lond. xii, p. 274, 1889.

(greenish?) run vertically from the upper to the lower surface of the eye (fig. 62). The fourth abdominal segment cannot be said to be carinate at all (cf. Kirby *l. c.*). The pterostigma of the teneral male is pale-colored for its entire length; in the adult males it is black for its entire length, as shown in Kirby's figure; in the females and in one adult male, it has the "exterior half white surrounded with fuscous," as described by Hagen. Considerable variation exists in the extent of the wing markings of the females.

Front wings with the sectors of the arculus varying from a condition in which they are separated from their origin to that in which they arise by a common stalk whose length may exceed that of the lower piece of the arculus; discoidal triangle crossed by one vein in both wings of 28 individuals, by two veins in both wings of 20 individuals; 18 individuals have one cross-vein on one wing, two on the other; 2 have three and one, 2 have three and two, 1 has the triangle free on both wings; one supratriangular in both wings of 7 individuals, in one wing only of 18 individuals, absent in the others; highest number of antecubitals 12, of postcubitals 7.

Hind wings with the discoidal triangle crossed by usually one, or in some cases two, cross-veins; one supratriangular present in both wings of 18 individuals, in one wing only of 21 individuals, absent in the remainder. One ♀ has the triangle altered to a quadrilateral on both hind wings.

The third joint of the penis is relatively long as compared with *Orthemis ferruginea*, *Libellula saturata*, etc., and becomes wider to the apex, which is without the two chitinous threads to be found in species of other genera. Anterior lamina projecting but little, its margin entire. Genital hamule the most prominent, its apical half bifid, inner branch much (one-fourth to one-fifth) the slenderer, decidedly curved, apex acute; outer branch obliquely truncated.

Abdomen ♂ 24–28, ♀ 23–26. Hind wing ♂ 29.5–35, ♀ 32–34.

Distribution. Mexico (Baja California, as above, Oaxaca, Tampico, Mazatlan).

The details of neuration given above, which are based on the entire 72 specimens, should be compared with the generic characters given by Kirby *(l. c.)* for Pseudoleon.

ORTHEMIS Hagen.

Hagen, Syn. Neur. N. A. p. 160, 1861. Kirby, Trans. Zool. Soc. Lond. xii, p. 286, 1889.

27. ORTHEMIS FERRUGINEA Fabricius. Pl. xvi, figs. 67–69.

Libellula f. Fabr. Syst. Ent. p. 423, 1775. *O. f.* Kirby *l. c.* p. 286, pl. lvii, figs. 3, 3*a*–*c*, 1889. For bibliography see *O. discolor* Burm. in Hagen, Proc. Bost. Soc. N. H. xviii, p. 73, 1875. *Lib. macrostigma* Rambur, Ins. Nevr. p. 57, 1842.

(a) 11 ♂ 9 ♀ Comondu, March, 1889, C. D. Haines.
(b) 16 13 San José del Cabo, not dated.
(c) 11 2 San José del Cabo, May, 1893.

of variation which may be estimated at .15 of one per cent. Kirby *(l. c.)* gives as a generic character of Orthemis that the internal triangle of the front wings is 4-celled[*] ("subtriangular space consisting of four cells"), and four is indeed the more usual number, but that number varies too much to serve as a generic distinction. Thus in the same lot of 208 ♂, 119 ♀, it was found that the internal triangle was 3-celled in both wings of 9 individuals, in one wing of 25, and 5-celled in both wings of 23, in one wing of 55 individuals. Summarizing these statistics in another way, the number of cells in the internal triangle of the front wings is asymmetrical with respect to the right and left sides of the body in 80 individuals out of 327, or 24½%. Of these 80, 72 have 4-cells in one front wing, 3 or 5 in the other, the 3 or 5-celled wing being the right one in 43, the left one in 29. Among those individuals in which the 3-celled condition exists in one or both front wings, males and females are almost in equal numbers, but where the 5-celled condition in one or both front wings occurs the males are almost three times as numerous as the females.

One cross-vein in the discoidal triangle of the front wings is a very constant feature; out of the same 327 individuals, two cross-veins were observed in the left wing of a single male; a free condition of this triangle was not found.

Abdomen ♂ 32–35, ♀ 34–36. Hind wing ♂ 39–43, ♀ 42–44.

Distribution. From Florida and Texas to southern Brazil and Chili.

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[*] His figure, *l. c.*, pl. lvii, fig. 3, however, shows five cells.

DYTHEMIS Hagen.

Hagen, Syn. Neur. N. A. p. 162, 1861. Brauer, Verh. Zool. Bot. Ges. Wien, xviii, pp. 368, 733, 1868. Kirby, Trans. Zool. Soc. Lond. xii, p. 298, 1889.

Synopsis of the North American species.

3 rows of posttriangular cells on the front wings.

Abdomen slender (not more than 1.5 mm. wide at 5 in ♂).

Wings yellowish at base, to median cross-vein on front wings, to the triangle on the hind wings; hind wings with dark streaks in subcostal and median spaces; venation reddish; frons above and vertex red to yellow. *rufinervis* Burm.

Wings yellowish or brown at base to first antecubital or less, extreme apex brown to a width of 1 or 2 cells (♂), hind wings with no dark streaks; venation blackish; frons and vertex yellow to metallic blue; antehumeral stripe as in *velox*. *sterilis* Hagen.

Wings brown at base to never more than half-way to first antecubital, apex brown to a width of 4 cells or more (♂); frons and vertex yellowish-green to brown; the pale antehumeral stripe one-third to one-fourth as wide as the brown which separates it from the mid-dorsal carina. *velox* Hag.*

Wings brownish at base, to internal triangle on front wings, to discoidal triangle on hind wings, with darker streaks in the subcostal spaces; frons and vertex reddish or yellowish; the pale antehumeral stripe nearly as wide as the brown separating it from the mid-dorsal carina. *fugax* Hag.

Abdomen stout (2.5 mm. wide at 4).

2 ♂	2 ♀	Comondu.
34	19	San José del Cabo, not dated.
15	11	San José del Cabo, September, 1893, G. Eisen.
40	30	San José del Cabo, October, 1893, G. Eisen.
30	30	Miraflores, September, 1894, Eisen & Vaslit.
202	161	San José del Cabo, September, 1894, Eisen & Vaslit.
323 ♂	253 ♀	

At first it seemed that these specimens represented a variety of *rufinervis* Burm., differing only as they do by color and not by any structural characters. Upon Mr. Henshaw's comparing a pair from San José del Cabo with Dythemis at Cambridge, he wrote: "Appears to me nearer to some specimens from Livingstone, Guiana, placed with *Dyth. sterilis* by Dr. Hagen than it does to *Dyth. rufinervis.* I send you one of these by mail." Further study of the specimen sent by Mr. Henshaw leads the writer to adopt his conclusion. The following description, however, having been previously drawn up, is mainly comparative with that of Mr. Scudder (Proc. Bost. Soc. N. H. x, p. 192, 1866) for his *vinosa* = *rufinervis.*

Frons usually "olivaceous yellow," brown above, labrum in some cases edged with black (Rambur's description, Ins. Nevr. p. 91, of *conjuncta* = *rufinervis*, speaks of the labrum as black), tip of the vertex slightly concave, vertex and occiput olivaceous. Thorax brown, mid-dorsal carina, a straight antehumeral and a sinuated humeral stripe greenish-yellow; a transverse greenish-yellow stripe, just in front of the antealar sinus, may or may not connect with the two preceding stripes at their upper ends, and extends almost to the mid-dorsal carina. On the sides of the thorax greenish-yellow may occupy the lower part of the mesepimeron, a stripe in front of the second lateral suture and the greater part of the metepimeron; or the brown may be reduced to a posthumeral stripe, a stripe at the (obsolete) first lateral and one at the second lateral suture. Abdomen greenish-yellow, 3–8 with a black stripe on the mid-dorsal and on the lateral carinæ, confluent posteriorly to form a transverse, apical band, 9–10 entirely black except at articulations; or the lateral black bands on 4–7 widened, united at base with mid-dorsal stripe, 8–10 black—intermediate forms connect these two extremes.

Superior appendages as long as 9+10, dark brown, acutely-pointed, with about four inferior denticles in the third fourth of their length. Inferior appendage about one-sixth shorter, yellowish except the edges and apex which are black, triangular, reaching beyond the denticles of the superiors. Anterior lamina with margin entire. Hamule more prominent than adjacent parts, not bifid, but with an external basal tubercle which may represent the outer branch of other genera, apex acute, slightly hooked externally. Genital lobe oblong, of nearly uniform width, apex rounded.

♂ ♀ Brownish-yellow on base of front and hind wings reaching at most to the first antecubital, often not so far; the dark brown streaks on the hind wings between the

Total length ♂ 38.5–41, ♀ 40–43. Abdomen ♂ 27.5–29.5, ♀ 28.5–31. Hind wing ♂ 28–31, ♀ 29–32. Pter. 3.5–4. Sup. app. ♂ 1.5., app. ♀ .8.

Summary of differences between *rufinervis* Burm. and *sterilis*:

rufinervis.	*sterilis*.
10 reddish-yellow.	black.
9 reddish-yellow, with a mid-dorsal and a lateral black stripe.	black.
Veins red.	black.
Hind wings yellowish from base to triangle, with two dark brown basal streaks.	yellowish from base to first antecubital, no basal streaks.

17 ♂ San José del Cabo, October, 1893, G. Eisen, are also apparently to be referred to *sterilis*, although at first the writer supposed them to be adult *velox*. The differences between *velox* and *sterilis* are so slight as to render their distinctness as species very doubtful. These 17 ♂ have frons and vertex dark metallic blue; thorax and abdomen either pruinose, or with pale markings more or less obliterated, such traces as still persist agreeing with those of either *sterilis* or *velox*. Hind wings brownish at extreme base, but the apices of the wings barely edged with brown (only to about the width of one cell); anterior lamina projecting but little, hairy; hamule not bifid, similar to that of *sterilis* as above; genital lobe longer than wide, projecting as far or nearly as far as the hamule, apex rounded; superior appendages black, slightly longer than 9, thickened in the apical third, the thickened part with about five inferior denticles, apex acute; inferior appendage about one-eighth shorter, subtriangular; front wings with 13–16 antecubitals, 8–11 postcubitals, triangle with one cross-vein, internal triangle 3-celled (4-celled in 2 ♂ and one wing of 1 ♂); hind wings with 10–11 antecubitals, 11–14 postcubitals, triangle free. Abdomen 27–31. Hind wing 30–34.

Distribution of sterilis. Mexico (Baja California, as above), Panama, Peru, Venezuela, Guiana, Brazil, Buenos Ayres.

29. DYTHEMIS RUSSATA (Hagen MS.) n. sp. Pl. xvi, figs. 46–49.

1♂		Sierra El Taste, west side, September, 1893, G. Eisen.
1	2♀	San José del Cabo, October, 1893, G. Eisen.
4	1	Sierra Laguna, October, 1893, G. Eisen.
1		Mesa Verde, October, 1893, G. Eisen.
5		Sierra San Lazaro, September, 1894, Eisen & Vaslit.
12♂	3♀*	

♂ Vertex distinctly bifid at tip, each division acutely pointed, ochre-brown, except at the base anteriorly which is blackish. Frons red, or greenish with a red tinge above, a narrow black line along the margin adjacent to the eyes; with a median superior groove dividing the upper surface into two rounded lobes, each lobe defined externally by a vertical carina which separates the anterior from the lateral surface of the frons. Clypeus and labrum light reddish-brown or greenish, labrum partly bordered with black on its free edge and with or without some dark markings at the base. Middle and lateral lobes of labium entirely black, or with outer third to half superior pleural margin black as far forwards as the hind end of the antealar sinus, the bands just described attaining this black by narrow upward prolongations.

Abdomen above red or reddish-brown, dorsum of 1, intersegmental articulations and some markings on either side of base and apex of 3–9 or 10 (those at base and apex of 8 and 9 connected in some ♂ ♂)—black, as well as the ventral surface.

Superior appendages black, as long as 9 + 10; viewed from above convergent from base to apex, slightly thickened in the apical two-thirds, thence tapering to the acute apex; viewed from the side, curved so as to be convex above for the first three-fourths of their length, straight in the apical fourth, of nearly uniform thickness as far as three-fourths of their length, where they are somewhat thickened and the inferior margin bears a row of 4–6 closely approximated denticles, extreme apex acute and slightly upturned. Inferior appendage about one-sixth shorter, brown, except along the edges and the apex which are black; viewed from the side, curved so as to be somewhat concave above; viewed from below, subtriangular, notched at the apex to form two denticles which are upturned.

Anterior lamina projecting as much as does the genital lobe, margin entire and when viewed from below strongly curved so as to be convex anteriorly. Hamule simple, not bifid, projecting twice as far as the lamina, apical half curved backwards and slightly outwards, tapering to the apex, which is acute but rounded at the extreme tip. Genital lobe but very slightly widened before the apex, which bears a rather dense tuft of short hairs.

Legs superiorly brownish or yellowish, inferiorly blackish; hind tibiæ with 10–12 spines on the anterior (outer) row, 13–15 on the posterior (inner) row.

Wings hyaline, fulvous at base for the entire width, on the front wing half- or two-thirds-way to the nodus, three-fourths-way or all the way to the nodus on hind wings. Pterostigma black, outer end more oblique. No supratriangulars. Front wings with 13–16 antecubitals, 9–12 postcubitals, discoidal triangle with one cross-vein, internal triangle 3-celled (4-celled in one wing only of 2 ♂), 3–4 post-triangular cells then 3 rows. Hind wings with 9–11 antecubitals, 11–14 postcubitals, triangle free (a ♂ from Arizona has one cross-vein in one wing, two in the other wing, 1 ♂ from San Lazaro has one cross-vein in both hind wings), three post-triangular rows increasing. Nodus situated at .51 of length of front wing, .40–.44 of length of hind wing.

♀ Differs from ♂ by pale olive replacing brown on face and vertex, no trace of red on frons, outer third of lateral lobes of labium pale greenish; thorax pale green, black markings similar to those of ♂ but not so extended; pale green replacing red or brown on abdomen, black spots at base and at apex of segments connected with each other, a black mid-dorsal spot on 10. Appendages black,

30. DYTHEMIS MENDAX Hagen. Pl. xvi, figs, 56, 57.

D. m. **Hagen, Syn. Neur. N. A. p. 164, 1861.**

1 ♂ San José del Cabo, September, 1893, G. Eisen.
2 ♀ San José del Cabo, October, 1893, G. Eisen.
1 Sierra Laguna, 2000 feet, October, 1893, G. Eisen.
2 ♂ 2 ♀

♂ Frons pale brown, superiorly with a slight metallic blue tinge, so also the vertex. Lips yellowish, middle lobe and inner margin of lateral lobes of labium blackish. Clypeus pale blue. Occiput and rear of head brownish, one or two bluish spots behind the eyes. Eyes above brown, below bluish.

Thoracic dorsum brown, a rather wide bluish antehumeral stripe, widened on the inner side at its upper end which reaches to the antealar sinus. Sides of thorax bluish with two approximate, oblique, brown stripes not entirely distinct from each other, the posterior of the two lying upon the second lateral suture. (One male has also a broken, oblique, brown stripe on the metepimeron.)

Legs dark brown, femora paler at the bases, anterior femora bluish inferiorly.

Abdomen compressed at base, narrower on the following segments, widened before apex, blackish brown; 2–5 with a bluish stripe each side on dorsum, these stripes narrower on 4–5, interrupted by the additional transverse carina on 2–3 and by the suture on 4–5; 7 with a wider stripe each side, 8 with a small spot at base — blue; ventral surface paler.

Superior appendages black longer than 9, not as long as 9+10, thickened in their apical half, thickened part with about seven inferior denticles, apex acute. Inferior appendage one-sixth shorter, subtriangular, sides straight, apex truncate.

Anterior lamina with margin entire. Hamule not bifid, projecting farther than adjacent parts, apical portion forming a sickel-shaped hook. Genital lobe rather small, projecting about as far as the lamina, about as wide as long, apex oblique, the acute angle anterior, the obtuse angle posterior.

Wings clear, only the faintest tinge of brown at the extreme base of the hind wings. Pterostigma black, membranule brown. Front wings with 11–13 antecubitals, 6–9 postcubitals, discoidal triangle with one cross-vein, internal triangle of three cells, two rows of post-triangular cells, or beginning with 3 cells. No supra-triangulars. Hind wings with 8–9 antecubitals, 8–10 postcubitals, triangle free.

♀ Differs from ♂ as follows: trace of a bluish spot on each side of dorsum of 6 as in preceding segments; appendages longer than 10, shorter than 9, simple, straight, black; vulvar lamina not produced, its apical margin bilobed; brownish-yellow at base of hind wings more marked, reaching the median cross-vein.

Total length ♂ 50.5–53, ♀ 50.5–51.5. Abdomen ♂ 36–38, ♀ 37–38. Wing expanse ♂ 72, ♀ 78. Hind wing ♂ 34.5, ♀ 36.5–37.5. Pter. 2.25. Width of abdomen at 2:

Fuller descriptions will be needed to determine whether these are two distinct species or variations in size.

MACROTHEMIS Hagen.

Hagen, Stet. Ent. Zeit. xxix, p. 281, 1868. Brauer, Verh. Zool. Bot. Ges. Wien, xviii, p. 734, 1868. Kirby, Trans. Zool. Soc. Lond. xii, p. 297, 1889.

31. MACROTHEMIS IMITANS Karsch. Pl. xvi, figs. 33–39.

M. i. Karsch, Berl. Ent. Zeit. xxxiii, pp. 364, 367, 1890.

7 ♂ 3 ♀ San José del Cabo, October, 1893, G. Eisen.
1 Sierra San Lazaro, September, 1894, Eisen & Vaslit.

♂ Frons and clypeus pale blue, the former superiorly and the vertex dark metallic blue. Lips yellowish or pale brown, labrum blue at middle of base, middle lobe and adjacent parts of lateral lobes of labium blackish. Occiput brown, rear of head green and brown.

Thorax brown, a greenish antehumeral stripe widening gradually upwards and differing in this particular from *M. inequiunguis*, where the stripe widens suddenly at its upper end; sides with four pale green spots, one on the mesepimeron, one on the metepisternum, two on the metepimeron.

Legs blackish, anterior femora greenish beneath; tarsal nails of all the feet bifid, the inferior branch (= tooth of other genera) thicker and slightly longer than the tip of the nail itself. (One ♂ has an imperfectly formed tarsus in which the nails are abnormally short and with a trace of a tooth.) Second and third femora, as noted by Hagen for Macrothemis, *l. c.*, p. 283, with a postero-inferior row of short teeth, directed towards the knee on the second, towards the base on the third.

Abdomen of form similar to that of *M. inequiunguis* ♂, blackish, the following markings bluish-green: an anterior transverse band on 2, interrupted on the mid-dorsal line; 3–5 with a stripe each side on dorsum not reaching the apices of the segments, interrupted by the additional transverse carina on 3, by the suture on 4, and to a greater extent on 5; on each side of 7 a large oval spot.

Superior appendages a little longer than 9, apical half thickened, no inferior tooth but a row of about 7 denticles on the lower surface of the third fourth. Inferior appendage one-fifth to one-sixth shorter, subtriangular, apex truncate, notched.

Anterior lamina with margin entire. Hamule more prominent than adjacent parts, simple, curved, apex acute, not hooked. Genital lobe very short, least prominent.

Wings clear, a very slight trace of deep brown at base of hind wings. Pterostigma black, membranule white or somewhat gray.

♀ Differs from male as follows: inferior branch of tarsal nails of second and third legs not quite as long as the tip of the nail, femora of same legs without the teeth, abdomen of almost uniform width; appendages blackish, a little longer than 10, straight, simple; vulva marked by a

27.5–28.5. Hind wing ♂ 29–30, ♀ 31–32.5. Pter. ♂ 2, ♀ 2.5. Width of abdomen of ♂ at 2: 2, at 5: 1, at apex of 7: 3, at 10: 1.3.

Distribution. Mexico (Baja California, as above), Brazil (Theresopolis, S. Catharina—Karsch's types).

According to Karsch's description, his specimens differ from those above described as follows: "Wings hyaline, in the ♀ often intense yellow and only on the hind margin narrowly hyaline, in both sexes the extreme base intense yellow and the subcostal space blackish-brown almost to the first cross-vein." Front wings with the "subtriangular space [= internal triangle] usually free, rarely 2-celled, more rarely 3-celled." He further states that in the hind wings of the ♀ are two post-triangular rows, of the ♂ at first only one row. Among the specimens from San José del Cabo, one female is like the males, one male like the females in this respect.

32. MACROTHEMIS INEQUIUNGUIS n. sp. Pl. xvi, figs. 40–45.

1 ♂		Sierra El Taste, September, 1893, G. Eisen.
4	1 ♀	San José del Cabo, September, 1893, G. Eisen.
2	1	San José del Cabo, October, 1893, G. Eisen.
1	2	San José del Cabo, not dated.
4		Miraflores, September, 1894, Eisen & Vaslit.
8	4	San José del Cabo, September, 1894, Eisen & Vaslit.
20 ♂	8 ♀[*]	

♂ Frons and vertex dark metallic green. Clypeus brown or blue. Lips yellowish, middle lobe and adjoining parts of lateral lobes of labium black. Occiput brown above, greenish behind. Rear of head greenish-yellow.

Prothorax brown, lobes with green margins. Thoracic dorsum deep brown, mid-dorsal carina, antealar sinuses, and an antehumeral stripe which is widened inwards at its upper end—light green. Sides pale green with ill-defined pale brown stripes on the two lateral sutures.

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[*] The description which follows is based on the 28 specimens.

Legs blackish, anterior femora green inferiorly. Tarsal nails toothed inferiorly before apex, tooth shorter than nail tip, hence departing from the normal form of Macrothemis. Second and third femora with teeth as described for *M. imitans.*

Abdomen blackish, 1–5 with a pale green stripe on each side of dorsum, this stripe usually interrupted by the black additional transverse carina (2–3) or suture (4–5); 6 in some cases with a small basal spot each side, 7 with a large oval spot each side, 8 with or without a small spot each side—pale green. Abdomen somewhat widened at base, thence gradually narrowing to 4, 4–5 of uniform width, 6–7 distinctly widened, 8–10 successively narrower. Ventral surface pale, lateral margins of segments and the sterna blackish.

Superior appendages black, a little longer than 9, rather slender, an inferior, median tooth whose basal side is denticulated and forms an acute angle with the appendage, apical side of the tooth entire, nearly at right angles

Wings clear or faintly yellowish especially in basal half, distinctly yellowish at base for not as much as the length of one cell. Pterostigma black, membranule white or slightly gray.

♀ Differs from the ♂ as follows: frons light brown or olive; vertex brown, with a trace of metallic blue in more adult individuals; lips in some cases entirely pale green; thoracic dorsum light brown, pale markings as in ♂; sides of thorax in some cases without any dark markings; tarsal nails as in ♂, second and third femora without teeth; markings of abdomen as in ♂ but the pale colors predominating over the black on 1–7; appendages black, longer than 10, longer than the anal tubercle; vulva marked by a small notch at apex of sternum of 8; 9 with a mid-ventral, longitudinal keel and a small palp on each side thereof; wings clear, front wings more or less yellow from base to the outer side of the triangle, hind wings yellow for an equal distance in costal, subcostal and median spaces; apex of all the wings brown, commencing at about one cell on the basal side of the pterostigma.

♂ ♀ Front wings with 10–12 antecubitals, 5–8 postcubitals, discoidal triangle free, internal triangle of one cell (2 in one wing 1 ♂, 3 in one wing 1 ♀), two rows of post-triangular cells. No supratriangulars, one median cross-vein. Hind wings with 7–9 antecubitals, 6–9 postcubitals, triangle free, one (♂) or two (♀) rows of post-triangular cells, sectors of the triangle slightly separated at their origins in a few specimens.

Total length ♂ 33–36, ♀ 34–35. Abdomen ♂ 23.5–25, ♀ 24.5–25. Hind wing ♂ 24.5–28, ♀ 29.5. Pter. 2. Width of abdomen of ♂ at 2: 1.4, at 5: .9, at apex of 7: 2.6–3, at 10: 1.

Inequiunguis is especially characterized by having the tarsal nails toothed before the apex, not bifid as in typical

Macrothemis. The differences between it and *imitans* are to be found in the tarsal nails, the appendages of the males, the color of the wings of the females, etc.

33. TRITHEMIS BASIFUSCA n. sp. Pl. xvi, figs. 58–61.

2 ♂		El Paraiso, not dated.
10	2 ♀	San José del Cabo, not dated.
1	1	San José del Cabo, September, 1893, G. Eisen.
57	22	San José del Cabo, October, 1893, G. Eisen.
4	4	Mesa Verde, October, 1893, G. Eisen.
3		Sierra El Taste, west side, September, 1893, G. Eisen.
21	8	Miraflores, September, 1894, Eisen & Vaslit.
3	1	San José del Cabo, September, 1894, Eisen & Vaslit.
101 ♂	38 ♀	

♂ Blackish; frons and vertex dark metallic blue. Occiput extending forward between the eyes, so that the latter are in contact for a distance equal to one-half of the length of the dorsal surface of the occiput. Superior appendages as long as 9, brown, darker at the tips, nearly straight, with an inferior row of about twelve denticles, apex acute. Inferior appendage about one-sixth shorter, reaching beyond the denticles of the superiors, viewed cubital, this spot being usually cleft on its outer edge at the basilar space. Pterostigma ochre-brown, membranule brown.

Teneral ♂ resembles the ♀ in color of thorax and abdomen.

♀ (teneral). Yellowish. Tibiæ, tarsi and lateral margins of abdominal segments 4–9 brown. Vulvar lamina about as long as 9, projecting and forming with the abdomen an angle of about 40°, margin entire. Appendages longer than 10, not as long as 9. Front wings pale yellowish at base to the first antecubital, hind wings pale yellowish for nearly their entire width from base to the arculus. Pterostigma yellowish.

♀ (adult). Yellow of the teneral ♀ becomes brown. Vulvar lamina forming an angle of 50°–60° with the abdomen—due to the extrusion of eggs? Extent of yellow on base of the wings very variable, in some cases confined to the extreme base.

♂ ♀ Front wings with 9–11 antecubitals, 6–8 postcubitals, discoidal triangle with one cross-vein, internal triangle of 3 cells, 3 rows of post-triangular cells. Hind wings with 7–8 antecubitals, 6–8 postcubitals, triangle free.

Total length ♂ 31–35.5, ♀ 29.5–32. Abdomen ♂ 20–23, ♀ 18.5–20.5. Hind wing ♂ 24–26, ♀ 24. Pterost. 3.5. Width of abdomen at 2: 2, at 5: 2.3, at 8: 2, at 10: 1.3.

This species seemed, judging from the descriptions of Rambur and Hagen, to be *T. abjecta*. Mr. Henshaw, having compared a pair of *basifusca* with specimens of *abjecta* in the museum at Cambridge, wrote "I should consider *Trithemis basifusca* a new species and different from any in the M. C. Z. collection; both sexes differ from the same of *abjecta* in the proportionate length of the wings and abdomen, in the general color of the body of the ♀ and the amount and hue of coloring on the wings of the ♂; the terminal abdominal appendages also differ in color and form."

MICRATHYRIA Kirby.

Kirby, Trans. Zool. Soc. Lond. xii, p. 303, 1889. Karsch, Berl. Ent. Zeit. xxxiii, p. 371, 1890. Calvert, Trans. Am. Ent. Soc. xx, p. 224, 1893.

Synopsis of the North American species.

Anterior lamina of ♂ at least as prominent as genital lobe; vulvar lamina of ♀ not projecting.

1. **Extreme base of hind wings yellowish. ♂ Anterior lamina bifid to base, apices narrower (viewed from the side), not denticulated; hamule more prominent than adjacent parts, curved forwards, outer branch longer than inner; sup. app. with no inner inferior subbasal tubercle. ♀ Abdomen widened at base and before apex, pale stripes on 3–6 narrow.** ***didyma*** **Selys.**
2. **Extreme base of hind wings reddish-brown. ♂ Anterior lamina biparted, apices denticulated; hamule less prominent than genital lobe, not curved forwards, outer branch much shorter than inner, sup. app. with no inner inferior subbasal tubercle. ♀ Abdomen of nearly uniform width, pale stripes on 2–6 wide.** ***Hagenii*** **Kirby.**
3. **Extreme base of hind wings uncolored. ♂ Anterior lamina bilobed to base, apices wider (viewed from the side), not denticulated; hamule less prominent than genital lobe, not curved forwards; sup. app. with an inner inferior subbasal tubercle. ♀ Abdomen widened at**

34. **MICRATHYRIA DIDYMA** Selys. Pl. xvii, figs. 98–102.

Libellula d. Selys in Sagra's Hist. Cuba, Ins. p. 453, 1857. *Dythemis d.* Hagen, Proc. Bost. Soc. N. H. xviii, p. 75, 1875. *M. d.* Kirby, Cat. Odon. p. 41, 1890. *Lib. phryne* Rambur, Ins. Nevr. p. 121, 1842. *Dythemis dicrota* Hag. Syn. Neur. N. A. p. 166, 1861; Proc. Bost. Soc. N. H. xi, p. 292, 1868. *Mesothemis Poeyi* Scudder, Proc. Bost. Soc. N. H. x, p. 194, 1866; xi, p. 300, 1868. Hagen, Stet. Ent. Zeit. xxviii, p. 98, 1867; Proc. Bost. Soc. N. H. xi, p. 292, 1868; xv, p. 375, 1873.

3 ♂ San José del Cabo, October, 1893, G. Eisen.
1 San José del Cabo, not dated.

♂ Closely resembles *M. Hagenii* in coloring, having however the green antehumeral stripe narrower, brown stripe on the first lateral thoracic suture not forked, green spots on abdominal segments 3–6 narrower—in fact, narrow stripes. Tip of vertex more distinctly bifid than in *Hagenii*. Superior appendages similar, but showing a tendency to form an obtuse inferior tooth at the position of the last denticle.

Distinctive characters presented by the genitalia. Anterior lamina bifid to base so that when viewed in front it forms a distinct and straight tubercle each side, whose apex is narrower than its base and is not denticulated. Hamule very peculiar, bifid; that which apparently corresponds to the external branch is greatly prolonged, more prominent than any adjacent part, curving forwards and ventrally as a lamellate process with its apex extending below and a short distance in front of the level of the anterior lamina; a short distance before its apex, this process is constricted, while the apex is widened into a flat plate whose apical margin is denticulated. The apparent homologue of the internal branch of other species is a small, curved, acute spine directed backwards and first inwards, then outwards, and projecting ventrally a little farther than the genital lobe. Genital lobe small, projecting equally with the anterior lamina, wider at apex than at base.

A slight yellow cloud at the extreme base of all the wings. Front wings with 9–12 antecubitals, 7–8 postcubitals, discoidal triangle with one cross-vein, internal triangle 3-celled (2-celled in one wing of 1 ♂), 3 post-triangular cells, then 2 rows. Hind wings with 7–8 antecubitals, 8–9 postcubitals, triangle free.

Total length 35–37. Abdomen 24.5–26. Hind wing 27–28.5. Pter. 3. Width of abdomen at 2: 2, at 5: .9, at apex of 7: 2, at 10: 1.

A male from Hayti (probably—Am. Ent. Soc. coll.) agrees with the above, except that the tendency to form an inferior tooth on the superior appendages is not so distinct. 8–9 antecubitals on hind wings, length 34, abd. 24, hind wing 26.5.

A female from Hayti by Dr. W. L. Abbott (Am. Ent. Soc. coll.) is similar in coloring. Vulvar lamina like that of *Hagenii*. Appendages as long as 9. Length 32.5, abd. 22, hind wing 27. The females of *Hagenii* and *didyma* are to be distinguished by the former having the abdomen robust and of nearly uniform width, each

10♂	1♀	San José del Cabo, not dated.
	1	San José del Cabo, September, 1893, G. Eisen.
123	17	San José del Cabo, October, 1893, G. Eisen.
3		Mesa Verde, October, 1893, G. Eisen.
7	2	Miraflores, September, 1894, Eisen & Vaslit.
1	5	San José del Cabo, September, 1894, Eisen & Vaslit.
144♂	26♀	

♂ Frons and clypeus pale green, the former often metallic above. Lips yellow or pale green, inner edge of lateral labial lobes brown. Vertex greenish, blackish anteriorly, or with a metallic reflection. Eyes brown above, green below. Occiput and rear of head dark brown or black, in some cases with two or three green spots on rear of eyes.

Thoracic dorsum brown (perhaps with a metallic green reflection in life), an antehumeral stripe not reaching the antealar sinus, a narrower, sinuated, humeral stripe, the antealar sinus, a transverse stripe in front of the sinus and connected by a line with the humeral stripe—green. Sides of thorax bluish-green, a stripe on the second lateral suture and one nearly in the position of the obsolete first lateral suture—brown, these two united at their upper ends, the latter forked in its upper half, and confluent below with the brown of the dorsum, the right and left stripes on the second lateral suture confluent across the pectus.

Abdomen decreasing in width from 2 to the base of 4, thence widening gradually to 6, much wider on 6–8, 9–10 successively narrower; black, a green band or spot on each side of 2, and on each side of 3–7 at base, the green interrupted by the black additional transverse carinæ on 2–3 and sutures on 4–5; green spots largest on 7; in some a very small green spot on each side of 10.

Superior appendages black, nearly as long as 9 + 10, rather slender, apices acute, somewhat upcurved, middle third with an inferior row of 6–7 denticles. Inferior appendage about one-seventh shorter, very distinctly narrowed in its apical half (viewed from below) so that the lateral margins are decidedly concave, extreme apex slightly notched.

Anterior lamina biparted when viewed in front, each half prolonged backwards towards the hamule and denticulated on the margin. Hamule not as prominent as the genital lobe,* its apex bifid, inner branch longer, hooked, outer branch very short, obtuse. Genital lobe as wide as long, rounded.

Legs blackish, first femora pale green below, third tibiæ with 11–13 spines on the anterior row, spines slightly longer than the intervals separating them.

♀ Similar to ♂. Abdomen of nearly uniform width. Vulvar lamina reaching to one-third of 9, its margin with a wide but shallow median emargination. Two small ventral palps on 9. Appendages longer than 10, not quite as long as 9, simple, straight.

♂ ♀ Front wings with 6–10 antecubitals, 6–9 postcubitals, discoidal triangle free, internal triangle 3-celled (2-celled in one wing of 1 ♂ 1 ♀), 2 or 3 post-triangular the triangle of the hind wings almost united at their origin in both wings of 3 ♂, in one wing only of 2 ♂.

Total length ♂ 32.5–37, ♀ 32–34. Abdomen ♂ 19–24, ♀ 21–23. Hind wing ♂ 25.5–29.5, ♀ 26.5–28. Width of abdomen of ♂ at 2: 1.7–1.8, at base of 5: 1.2–1.3, at apex of 7: 2.5–3, at 10: 1.

Distribution. Mexico (Baja California as above, Tampico, Matamoras, Tekanto in Yucatan, March 1, 1890, by Phila. Ac. Nat. Sci. Exped.), Texas (1 ♀ Am. Ent. Soc. coll.), Cuba.

36. MICRATHYRIA ÆQUALIS Hagen. Pl. xvii, figs. 107–109.

Dythemis æ. Hag. Syn. Neur. N. A. p. 167, 1861; Proc. Bost. Soc. N. H. xi, p. 293, 1868; xviii, p. 76, 1875. *Macrothemis æ.* Kirby, Cat. Odon. p. 33, 1890. *Micrathyria æ.* Kirby, Ann. Mag. N. H. (6) xiv, p. 267, 1894.

2 ♂	1 ♀	San José del Cabo, not dated.
6	1	San José del Cabo, September, 1893, G. Eisen.
2		Miraflores, September, 1894, Eisen & Vaslit.
2		San José del Cabo, September, 1894, Eisen & Vaslit.
12 ♂	2 ♀[*]	

♂ Resembles *M. Hagenii.* Clypeus pale green or yellow; in some cases no brown on lateral labial lobes; occiput greenish-brown or black. Thorax pruinose. Abdomen pruinose at base, green spots visible only on 6 and 7 or on 7 alone, cuneiform. Superior appendages similar, but with a distinct inner-inferior tubercle just after the base. Inferior appendage more gradually narrowed to the tip, so that the lateral margins are less concave when viewed from below. Genitalia of 2 quite distinct. Anterior lamina bilobed, each lobe lamellate, projecting as much as the genital lobe, much wider just before the apex than at the base when viewed from the side, the two lobes divergent when viewed in front, apices not denticulated. Hamule short, bifid, inner branch the more slender, not as prominent as in *Hagenii*, shorter than the outer branch which is lamellate, obtuse. Genital lobe of equal prominence with the hamule, rounded.

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[*] The following description is based on the 14 specimens.

♀ Head as in the ♂. Thoracic dorsum brown, the following green: an antehumeral stripe not reaching the sinus above, a narrow, submedian stripe on each side of the carina, a humeral stripe, the antealar sinus, and a transverse stripe in front of the sinus confluent with the upper end of the humeral. Sides of thorax green with four oblique brown stripes, viz.: on mesepimeron, on metepisternum, on second lateral suture and on metepimeron, the first two anastomosing. Abdomen (of both ♀ and ♂) shaped as in *M. Hagenii* ♂, black, a green stripe on each side of 2–7. Vulvar lamina entire, two small ventral palps on 9. Appendages as long as 9, simple, straight, anal tubercle three-fourths as long.

♂ ♀ Front wings with 8–9 antecubitals, 6–7 postcubitals, discoidal triangle free (1 cross-vein in one wing of 1 ♂), internal triangle 2-celled (3-celled in 2 ♂ and one wing of

Synopsis of Species.

1. **Olive or brown; legs black, femora and tibiæ with a superior yellow stripe; no dark basal streak to the wings. ♂ Sup. app. with the inferior row of denticles forming a reversed curve and the apex gradually tapering when viewed in profile. ♀ Vulvar lamina not projecting. *corrupta* Hagen.**
2. **Reddish; legs luteous; wings with at least one dark basal streak. ♂ Sup. app. with the inferior row of denticles forming an almost straight line and the apex obliquely truncated when viewed in profile. ♀ Vulvar lamina projecting. *illota* Hagen.**

Both species have an additional transverse carina on the fourth abdominal segment, and the vulvar lamina of the female emarginated at the middle of the apex.

37. DIPLAX CORRUPTA Hagen. Pl. xvii, figs. 120–123.

Mesothemis c. **Hagen, Syn. Neur. N. A. p. 171, 1861; Proc. Bost. Soc. N. H. xviii, p. 77, 1875. *D. c.* Selys, Ann. Soc. Ent. Belg. xxviii, p. 43, 1884. Calvert, Trans. Am. Ent. Soc. xx, p. 264, 1893.**

1 ♂	**3 ♀**	**San José del Cabo, May, 1893.**
1		**San José del Cabo, September, 1893, G. Eisen.**
30	**16**	**San José del Cabo, October, 1893, G. Eisen.**
1	**2**	**Sierra Laguna, October, 1893, G. Eisen.**
33 ♂	**21 ♀**	

Distribution. Mexico (Baja California as above, Matamoras) to Montana, California to Illinois, Pennsylvania (rare); Ochotsk in Asia.

38. DIPLAX ILLOTA Hagen. Pl. xvii, figs. 114–119.

Mesothemis i. **Hagen, Syn. Neur. N. A. p. 172, 1861; Proc. Bost. Soc. N. H. xviii, p. 78, 1875. *D. i.* Selys, Ann. Soc. Ent. Belg. xxviii, p. 43, 1884; form *virgula* Selys *l. c.* p. 44; form *gilva* Selys p. 43.**

8 ♂		**Mesa Verde, October, 1893, G. Eisen.**
5	**1 ♀**	**Sierra Laguna, October, 1893, G. Eisen.**
13 ♂	**1 ♀**	

The three forms recognized by de Selys *(l. c.) illota* type, *virgula* and *gilva* are distinguished by him as follows:

illota type.	*virgula.*	*gilva.*
a. Wings saffron as far as the nodus.	*a.* As far as the nodus.	*a.* As far as the triangle* on hind wings, not so far on front wings, and only in subcostal and median spaces.
b. Front wings with a black basal streak in subcostal space to beyond first antecubital.	*b.* Vestige of a basal streak on front wings.	*b.* No black basal streak on front wings.
c. Hind wings with two black basal streaks, one in subcostal space to about as far as second antecubital, the other in the median space to the cross-vein.	*c.* Black, basal streak in subcostal space nearly to first antecubital, that in median space very short.	*c.* Only one black basal streak, viz.: in subcostal space hardly reaching first antecubital, or less. Reticulation more blackish than in *illota* type and *virgula.*
Hab. California, Nevada.	Hab. Oaxaca, Vera Cruz, Putla—Mexico; Santa Clara—Cent. Am.	Hab. Colombia, Venezuela, Ecuador.

Of these three forms, Baron de Selys says, "I am persuaded that the three forms pertain to a single species *(illota)*, several examples showing intermediate characters." This statement is borne out by the specimens

Agreeing with *gilva* throughout, 1 ♂ +. Abd. 23, h. w. 28.

♂ Genitalia of 2 much like those of *corrupta;* external hamular branch not quite as long, relatively to the length of the inner branch, genital lobe longer. Superior appendages resembling those of *corrupta;* in *corrupta* the inferior row of denticles when viewed from below forms a reversed curve, convexity towards the inner side in the basal half, towards the outer side in the apical half; in *illota* this same row is almost a straight line, the denticles are often fewer in number and separated by longer intervals, but not always so. The shape of the apex of the superior appendages is referred to above. ♀ Vulvar lamina like that of *corrupta*, but projecting.

Distribution. British Columbia to Ecuador, Yellowstone.

CANNACRIA Kirby.

Kirby, Trans. Zool. Soc. Lond. xii, p. 300, 1889.

Synopsis of species.

1. Head yellowish; abdomen rufo-testaceous with a black dorsal band on 3 or 4–9; wings more or less tinged with smoky yellow especially towards costa. ♂ Sup. app. with no inferior tooth, apex tapering (Kirby's fig.) *batesii* Kirby.
2. Head luteous or reddish; abdomen reddish with or without a dorsal black spot on 8–9; hind wings with a small basal yellow cloud. ♂ Sup. app. with a submedian, inferior tooth, apex tapering, inf. app. half as long; anterior lamina not as prominent as hamule and genital lobe, apex emarginated for about one-fifth the height of the lamina, tips with a few, very small spines. *furcata* Hagen.
3. Frons, vertex and labrum brownish (teneral) or dark metallic blue; abdomen yellowish- or reddish-brown with a black dorsal band on 3 or 4–9, widened at apex of each segment; wings with a yellowish- or reddish-brown cloud between nodus and pterostigma. ♂ Sup. app. with a submedian, inferior tooth, apex rounded; inf. app. more than half as long; anterior lamina more prominent than hamule or genital lobe, apical half biparted, tips with short spines. *gravida* Calvert.

Batesii Kirby is from the Amazon and is further referred to under *furcata* below. *Gravida* Calvert, described as a Lepthemis (Trans. Am. Ent. Soc. xvii, p. 35, 1890, pl. v, figs. 11–13), inhabits Florida and Texas, and was referred to Cannacria by the writer in Ent. News, v, p. 193.

39. CANNACRIA FURCATA Hagen. Pl. xvii, figs. 110–113.

Erythemis f. **Hagen, Syn. Neur. N. A. p. 169, 1861. Kirby, Cat. Odon. p. 40, 1890. *C. f.* Karsch, Berl. Ent. Zeit. xxxiii, pp. 348, 361, 373, 1890.**

3 ♂ San José del Cabo, not dated.
2 San José del Cabo, October, 1893, G. Eisen.
1 Miraflores, September, 1894, Eisen & Vaslit.
1 ♀ San José del Cabo, September, 1894, Eisen & Vaslit.

As there has been some discussion as to this species, a description is added, based on the above seven individuals, one male from the Bahamas and one female from Jamaica.

♂ General color luteous or reddish-brown, abdomen bright red in life.

Tip of vertex truncate, slightly notched in the middle. Frons reddish, rounded, no vertical carinæ separating its sides from the anterior surface. Labrum reddish or yelslightly constricted after the base, thence gradually dilating, especially on the inner side, to two-thirds their length, thence tapering to the acute apex. Viewed from the side, each appendage is curved downwards in its basal half, thence upwards in its apical half; it gradually increases in thickness from the base and forms a well-marked tooth on its lower surface at not quite half its length; from the tooth it gradually tapers to the acute apex; on the lower surface between the base and the tooth are eight to twelve denticles.

Inferior appendage half as long, luteous; viewed from below, broad, apex more than half as wide as the appendage is long and deeply concave from side to side, the two lateral apices so formed are upcurved, unguiculate, reaching distinctly beyond the tooth of the superiors.

Genitalia of 2 moderately prominent. Anterior lamina not quite as prominent as the hamule, thickened at each side, apex broad, concave from side to side. Hamule simple, lamellate, narrowed in its apical fourth to form the acute, somewhat unguiculate apex, which is directed outwards and backwards. Genital lobe as prominent as the hamule, broader before the apex than at the base.

Wings hyaline, slightly smoky, reticulation brown, costa partly yellow. Pterostigma luteous, narrow, about one-fourth as wide as long. Membranule cinereous. A very small ferrugineous tinge at the base of the front wings. Hind wings with a ferrugineous basal spot extending outwards nearly to the median cross-vein, and from the submedian nearly to the hind margin. Sectors of the arculus barely stalked, or not stalked, at their origin in the front wings, stalk somewhat longer in the hind wings. No hypertrigonals (present in the front wings of 1 ♂). One median cross-vein, placed nearer the base than the first antecubital. Nodal sector hardly waved. Front wings with 8–10 antecubitals, the last not continuous, 7–9 postcubitals, triangle with one cross-vein, internal triangle of three cells, three rows of post-triangular cells. Hind wings with 6 (7 in one wing of 1 ♂) antecubitals, 7–9 postcubitals, triangle free (one cross-vein in one wing of 1 ♂), its inner side in the prolongation of the arculus, no internal triangle, two rows of post-triangular cells, sectors of the triangle arising from the same point. The male from Miraflores has, in the left front wing only, one basilar cross-vein which is continuous with the median cross-vein.

♀ Differs from the male as follows: Abdomen not so strongly dilated at the base when viewed from the side. Appendages a little shorter than 9 + 10, luteous, simple. Vulvar lamina very small, not extending beyond 8, notched in the middle of its margin. The San José female, moreover, has the face pale green, becoming yellowish on the lips, the thorax less reddish, pale greenish around the wing-bases, the last antecubital continued to the median vein on both front wings.

Total length ♂ 37–42, ♀ 40–45. Abdomen ♂ 24–28, ♀

(Trans. cited, p. 300). The characters given for Cannacria agree entirely with the present specimens, save that the abdomen is stated to be as long as the hind wings. Dr. Karsch *(l. c.* p. 361) further states, "Kirby has founded the genus Cannacria on a species described as new, *C. batesii*, which I am not able to separate specifically from a typical male specimen of *Erythemis furcata* Hagen from Bahia (from Gomes) in the Königliche Museum für Naturkunde at Berlin; only that there are in the hind wings not 6, but 7 antenodal cross-veins as in the figure accompanying Kirby's description."

The writer is not satisfied as to the specific identity of *furcata* Hag. and *batesii* Kirby (Trans. cited p. 341, pls. liii f. 1, lvii f. 9) for the following reasons: 1. The figure of the ♂ appendages of *batesii* does not show the tooth on the lower surface of the superiors which is here described and figured for *furcata*. 2. *Batesii* is described and figured as having the abdomen with "a black dorsal band, commencing at the end of the third segment, and covering the middle of segments 4–9, and widened at the end of each segment to cover the entire width." No such band exists on the present specimens, nor is it mentioned in Dr. Hagen's description.

Little weight is to be attached to the fact that the dimensions of *furcata* are given as, length 40 mm., alar expanse 70 mm., and those of *batesii* as, length 48 mm., alar expanse 80 mm., or to the difference in the number of cross-veins. It is to be noted that although the generic characters of Cannacria include "abdomen as long as the hind wings," the life-size figure of *batesii* shows the abdomen to be 34.5 mm. long, the hind wing 37 mm.

Lastly, it is to be noted that Mr. Kirby has described a *Cannacria Smithii* [Ann. Mag. N. H. (6) xiv, p. 266, Oct., 1894] from the West Indies. As is unfortunately too often the case, Mr. Kirby omits all reference to *structural* details from his description, and there is nothing to show that *Smithii* differs specifically from *Batesii*.

Distribution (of *furcata*). Mexico (Baja California as above, Tampico), Cuba, Jamaica (1 ♀ by C. W. Johnson), Bahamas (1 ♂ Nassau, New Providence, November 12, 1890, by J. P. Moore and D. J. Bullock), Brazil (Bahia).

MESOTHEMIS Hagen.

Hagen, Syn. Neur. N. A. p. 170, 1861. Brauer, Verh. Zool. Bot. Ges. Wien xviii, p. 721, 1868. Kirby, Trans. Zool. Soc. Lond. xii, p. 303, 1889. Calvert, Trans. Am. Ent. Soc. xx, p. 225, 1893.

40. MESOTHEMIS SIMPLICICOLLIS Say, var. COLLOCATA Hag. Pl. xvii, figs. 103–106.

M. c. Hagen, Syn. Neur. N. A. p. 171, 1861; Rep. U. S. Geol. Sur. Terr. 1873, p. 587, 1874; Proc. Bost. Soc. N. H. xviii, p. 77, 1875.

2♂		San José del Cabo, not dated.
	1♀	San José del Cabo, May, 1893.
6		San José del Cabo, September, 1893, G. Eisen.
10	4	San José del Cabo, October, 1893, G. Eisen.
	1	Mesa Verde, October, 1893, G. Eisen.

For the female of *collocata*, Hagen says *(l. c.* 1874) "the appendages are yellowish, but the quadrangular black dorsal spot on the segments 4–10 [*i. e.* of *simplicicollis*] is wanting; only the sutures and margins of all the segments are black." In a female from Los Angeles, Cal., by Dr. A. Davidson, in the writer's collection, there is only a narrow black stripe running along the mid-dorsal longitudinal carina of 3–9, but in the four females from San José del Cabo, October, 1893, this stripe is slightly but distinctly wider on the apical halves of 4–7, and becomes an apical spot on 8–9; this difference between this form and the typical *simplicicollis* is therefore one of but slight degree.

It seems doubtful if *collocata* can rank even as a variety. Abdomen ♂ 27–29.5, ♀ 26–28. Hind wing ♂ 30–32, ♀ 30.5–32.5.

Distribution (of *simplicicollis)*. United States east of the Rocky Mountains, Mexico (Matamoras, Huastec), West Indies, Bahamas; of *collocata*, according to Hagen, 1875, Texas, Yellowstone, California — to which must now be added Baja California.

Appendix on certain species from California.

Sent with the others by the California Academy of Sciences.

CALOPTERYX MACULATA Beauvois.

Hagen, Psyche v, p. 249, 1889. Calvert, Trans. Am. Ent. Soc. xx, p. 227, 1893.

One male, California. This species, common throughout the eastern United States, has not hitherto been known west of Kansas.

EUTHORE FASCIATA Hagen.

Thore f. Hagen, Syn. Calopt. p. 70 (1853), etc. *E. f.* Selys, Bull. Ac. Belg. (2) xxvii, p. 676 (1869).

One male, California; the last four abdominal segments are wanting; hind wing 30 mm., front wings with 32 (right), 29 (left) antecubitals, the 5th and 10th (right), 6th and 9th (left) thicker than the others; the first two yellow, lateral, thoracic stripes reach the coxæ. The dark transverse band on the wings is not fully colored; its extent exactly agrees with the description of a male variety from Porto Cabello, Venezuela, mentioned in the Mon. Calopt. p. 260, as follows: "the brown band does not extend as far as the pterostigma on the superiors, and ends at its origin on the inferiors; in a word the apical hyaline part of the wings is broader and equals half the breadth of the brown band."

Since this species is known only from Venezuela and Colombia, its discovery in California is of great interest, should no mistake have been made as regards the locality from which this individual came. Hitherto the genus *Euthore* has been regarded as exclusively South American.

EPOPHTHALMIA ELEGANS Brauer.

Macromia e. **Brauer, Verh. Zool. Bot. Ges. Wien xv, p. 905, 1865.** Reise d. Novara, Neur. p. 76, pl. 2, f. 4, 1866. *E. e.* Selys, en forme de pli" on each side of the vulvar lamina not distinguishable, perhaps owing to the compression of the apical half of the abdomen. Abdomen 58, hind wing 53.

This species has hitherto only been known from China and Japan; its occurrence in California, should the locality be correct, is very interesting. There seems to be no doubt of its being this species, the correspondence with the descriptions is so exact and the differences above given are not of specific value.

EXPLANATION OF PLATES.

PLATE XV.

Fig. 1. *Ischnura? erratica* n. sp., right side 10th segment and appendages ♂.

Fig. 2. *Isch. exstriata* ♂ n. sp. id.

Fig. 3. *I. cervula* Selys ♂ id.

Fig. 4. *I. perparva* Selys ♂ id.

Figs. 5–6. *I. Ramburii* Selys, var. *credula* Hag. ♂. 6 as above, 5 dorsal view of right superior appendage; *ex* outer, *in* inner branch.

Fig. 7. *Enallagma Eiseni* n. sp. ♂., right side of 10th segment and appendages.

Fig. 8. *Enal. cæcum* Hag. ♂ id.

Fig. 9. *Erythragrion salvum* Hag. ♂ id.

Figs. 10–11. *Archilestes grandis* Ramb. 10, dorsal view of appendages of ♂; 11, left side last two segments and genital valvules *vg.* of ♀. There is considerable variation in the form of the appendages from that shown in fig. 10 as regards the proportional length of the thickened parts and the abruptness or gradual curving of their outline, but these variations are connected by intergrades and are not of specific value.

Fig. 12. *Argia cuprea* Hag. ♂ oblique profile view from behind of left superior and inferior appendages.

Fig. 13. *Argia vivida* Selys ♂ id.

Fig. 14. *Argia agrioides* n. sp. ♂ id.

Figs. 15–16. *Anax junius* Drury ♂. 15, dorsal view, 16, right side of 10th abdominal segment and appendages.

Figs. 17–18. *Anax Walsinghami* McLach. ♂ id.

Figs. 19–20. *Æschna californica* n. sp. ♂ id.

Figs. 21–22. *Argia œnea* Selys ♂. 21, dorsal view of left superior appendage; 22, oblique profile view from behind of left superior and inferior appendages (more highly magnified than 21).

Fig. 23. *Æschna californica* n. sp. ♂. Left side spinous tubercle on ventral surface of first abdominal segment, turned upside down.

Fig. 24. *Æschna cornigera* Brauer var. ♂ id.

Figs. 25–26. *Æschna multicolor* Hag. ♂. 25, dorsal view, 26, right side of 10th abdominal segment and appendages.

Figs. 27–28. *Æschna luteipennis* Burm. ♂ id.

Figs. 29–30. *Æschna constricta* Say ♂ id.

Figs. 31–32. *Æschna cornigera* Brauer ♂ var., id.

PLATE XVI.

Figs. 33–39. *Macrothemis imitans* Karsch. 33, left side genitalia of second abdominal segment ♂; 34, margin of anterior lamina from in front; 35, a tarsal nail ♂; 36, ventral view of vulvar notch ♀; 37, right side of 10th abdominal segment and appendages ♂; 38, ventral view inferior appendage ♂; 39, triangle and internal triangle of right front wing ♂.

Figs. 40–45. *Macrothemis inequiunguis* n. sp. 40, left side genitalia of second abdominal segment ♂; 41, a tarsal nail ♂; 42, ventral view of vulvar notch ♀; 43, right side of 10th abdominal segment and appendages ♂; 44, ventral view inferior appendage ♂; 45, triangle and internal triangle of right front wing ♂.

Figs. 46–49. *Dythemis russata* n. sp. 46, left side of genitalia of second abdominal segment ♂; 47, terminal part of penis, left side ♂; 48, ventral view of vulvar notch ♀; 49, right side of 10th abdominal segment and appendages ♂.

Figs. 50–51. *Dythemis velox* Hag. ♂. 50, dorsal view, 51, left side of terminal joint of penis.

Figs. 52–55. *Dythemis sterilis* Hag. 52, ventral view 9th and 10th abdominal segments and appendages ♀; 53, left side of genitalia of second

Figs. 70–73. *Libellula saturata* Uhler ♂. 70, right side 10th abdominal segment and appendages; 71, left side genitalia of second abdominal segment; 72, left hamule from in front; 73, terminal part of penis, left side.

Figs. 74–79. *Progomphus obscurus* Ramb. 74, triangle and adjacent parts of right front wing ♂; 75, right side 10th abdominal segment and appendages ♂, dorsal margin to the left, ventral to the right; 76, oblique view of inner edge of apex of inferior appendage, showing teeth ♂; 77, ventral view inferior appendage ♂, 78, ventral view genitalia of second abdominal segment ♂; 79, ventral view vulvar lamina ♀.

Figs. 80–84. *Octogomphus specularis* Selys. 80, dorsal view 10th abdominal segment and appendages ♂; 81, right side of same, dorsal margin to the left, ventral to the right; 82, ventral view 9th and 10th abdominal segments and appendages ♀; 83, profile of vertex ♀ from in front, *oc* ocelli; 84, left hamules ♂, side view.

PLATE XVII.

Figs. 85–87. *Tramea onusta* Hag. 85, left side genitalia second abdominal segment ♂; 86, right side 9th and 10th abdominal segments and appendages ♂; 87, ventral view 9th and 10th abdominal segments ♀.

Figs. 88–89. *Tramea longicauda* Brauer? var. ♂. 88, left side genitalia second abdominal segment; 89, right side 9th and 10th abdominal segments and appendages.

Figs. 90–91. *Pantala hymenæa* Say ♂. 90, like 89; 91, left side of penis and its vesicle, other parts removed.

Figs. 92–94. *Pantala flavescens* Fabr. ♂. 92, like 89; 93, like 88; 94, anterior lamina, front view.

Figs. 95–97. *Micrathyria Hagenii* Kirby. 95, left side genitalia of second abdominal segment ♂, penis protruded; 96, anterior lamina ♂ front view; 97, ventral view 9th and 10th abdominal segments and appendages ♀.

Figs. 98–102. *Micrathyria didyma* Selys ♂. 98, left side genitalia of second abdominal segment; 99, ventral surface, apex of outer hamular branch; 100, anterior lamina, front view; 101, oblique profile view from above of base of left superior appendage; 102, right side 10th abdominal segment and appendages.

Figs. 103–106. *Mesothemis simplicicollis* Say, var. *collocata* Hag. 103, left side 9th and 10th abdominal segments and appendages ♀; 104, right side 10th abdominal segment and appendages ♂; 105, left side genitalia second abdominal segment ♂; 106, terminal part of penis, left side.

Figs. 107–109. *Micrathyria æqualis* Hag. ♂. 107, oblique profile view from above of base of left superior appendage; 108, anterior lamina, front view; 109, left side genitalia of second abdominal segment.

Figs. 110–113. *Cannacria furcata* Hag. 110, right side 9th and 10th abdominal segments and appendages ♂; 111, left side genitalia second abdominal segment ♂; 112, anterior lamina ♂, front view; 113, ventral view 9th and 10th abdominal segments and appendages ♀.

Figs. 114–119. *Diplax illota* Hag. 114, left side genitalia second abdominal segment ♂, penis protruded; 115, ventral view of same; 116, ventral surface right superior appendage ♂, showing row of denticles; 117, right side 10th abdominal segment and appendages ♂; 118, profile view, left side, vulvar lamina, etc. ♀; 119, ventral view of same.

Figs. 120–123. *Diplax corrupta* Hag. 120, ventral surface right superior appendage ♂, showing row of denticles; 121, right side 10th abdominal segment and appendages ♂; 122, ventral view 9th and 10th abdominal segments ♀; 123, left side genitalia second abdominal segment ♂.

In all the figures—

al anterior lamina
au auricle
eh outer branch of hamule
gl genital lobe
h hamule
h^1, *h^2*, ant. and post. hamules in fig. 78.
ih inner branch of hamule
it internal triangle
p^1, p^2, p^3 joints of penis
sp sheath of penis
t triangle
vl vulvar lamina
vp vesicle of penis.

In all figures of side views of the genitalia of the second abdominal segment of the male, the parts are shown as they appear when the insect is held upside down.

TWO SPECIES OF AQUILEGIA FROM THE UPPER SONORAN ZONE OF COLORADO AND UTAH.

BY ALICE EASTWOOD.

With Plates xviii and xix.

AQUILEGIA MICRANTHA n. sp. Perennial; lower part of stem and leaves unknown; upper part villous with white hairs, viscid especially between the rounded irregular ribs; leaves triternate; petioles equaling or surpassing in length the rest of the leaf, very viscid and clothed with long white hairs which are most numerous on the edge, strongly ribbed, dilated at base, spreading into sheathing membranous undulate, stipule-like margins, which are very viscid and villous; upper leaves almost sessile; upper petiolules longer than the two lateral and with larger leaflets; leaflets cuneate, 3-cleft or divided irregularly, with rounded obtuse or acute lobes, somewhat revolute on the margins; under side more viscid and hairy than the upper and with veins more distinct; flower about 2 cm. across, cream-white; sepals 10 mm. long, 4 mm. broad with a short broad claw, ovate, acute, somewhat hairy and viscid on the back; petals with spurs straight or curved, varying in length, upper part truncate or slightly retuse about 7 mm. long and 5 mm. broad; stamens numerous with filaments of different lengths; anthers about 1 mm. long; united staminodia surpassing the petals; styles surpassing the stamens, curved at apex; fruit of four or five follicles about 15 mm. long without the styles which are about the same length, with strong veins branching downwards from the midnerve, somewhat viscid and villous; seeds glossy black.

The type is fragmentary and was sent to me by Mr. Alfred Wetherill of Mancos, Colorado. He reports it as abundant in the cañons of the San Juan River in southeastern Utah, growing under shady cliffs where the rocks and soil are always moist from the oozing alkaline water. It was, according to Mr. Wetherill, so similar in manner of growth and general appearance to *Aquilegia ecalcarata* that at first he thought it that species.

Collected near Bluff City, southeastern Utah, July, 1894.

AQUILEGIA ECALCARATA Eastwood, Zoe ii, 226, Zoe iv, 3, 259. This Aquilegia from one of the cañons of the Mancos River in southwestern Colorado, appears closely related to *A. micrantha*, and it has seemed to me desirable to figure it on the same plate, so as to show the two together. It resembles Isopyrum in the general outline of the flowers and might be looked upon as a connecting link between that genus and Aquilegia. However, a close inspection discovers it to be a true Aquilegia with abortive spurs, and, upon comparison with *A. micrantha*, it seems most closely related to that species; but whether its degenerate descendant or less specialized progenitor or perhaps even a starved, cave-dwelling form, cannot be now settled. The fact, too, that these two Columbines are

According to the Index Kewensis, *A. ecalcarata* is a synonym of *A. vulgaris* L. As I am not in sympathy with the movement that is producing such chaos in nomenclature and do not care to become a name changer myself, I here leave it with the name under which it has been described and add a general description, so as to bring together all that is known about it.

AQUILEGIA ECALCARATA Eastwood. Perennial, from a long woody tap-root, stems numerous from a tufted base which is covered with the brown sheaths of dead leaves, glaucous, slightly viscid, above angled, below ribbed, above sparingly villous and more viscid; leaves on long slender petioles which are dilated at base into stipule-like sheaths, triternate with filiform petiolules; leaflets cuneate, irregularly lobed or divided with lobes obtuse, often the upper one acute, paler on the under side, thin and wavy; upper leaves with broad sheathing petioles; flowers numerous, panicled, on long slender pedicels; upper bracts few, linear-lanceolate 5 mm. long; lower bracts similar to the upper leaves but smaller; flowers 2 cm. broad, pink or white, of delicate texture, with a strong sweet perfume; sepals ovate-lanceolate, with a short claw which is thickened in the middle by the veins which spread out on the lamina, slightly viscid and villous on the back, ciliate with rather coarse hairs; petals 12 mm. long and about 2 mm. broad, terminating at base in a small sac-like spur, emarginate, ciliate and veiny; stamens numerous, the filaments nearly equal, hardly surpassing the petals; staminodia united, shorter than the petals, ovary somewhat viscid and hairy, styles smooth, curved at the apex, hardly surpassing the stamens; fruit and seeds similar to *A. micrantha*.

This was first described from a fragmentary specimen sent me by Mr. Wetherill, who found it June, 1891.

Professor Marcus E. Jones redescribed it in his Revision of Aquilegia, Zoe iv, 3, 259, making the section Pseudaquilegia to contain it. The characteristics of this section will have to be modified so as to also include *A. micrantha*, and I suggest the following:

Pseudaquilegia—leaves triternate, spurs irregular or abortive, flowers small.

In the early part of September, 1892, I visited the type locality, which is in the Ute Reservation of Colorado, about twenty-five miles from Mancos, and collected fruiting specimens which were distributed to the principal herbariums of this country. Roots and seeds were also obtained; but of all that was distributed the only survivors are in the garden of Mr. J. T. Henderson of Denver, Colo., where they have bloomed during the past two summers.

EXPLANATION OF PLATES XVIII AND XIX.

1 **Aquilegia ecalcarata.**
    1a **lower leaf on piece of stem, natural size.**
    1b **upper leaves on stem, natural size.**
    1c **part of a fruiting stem, natural size.**

NOTES ON WEST AMERICAN CRUSTACEA.

BY SAMUEL J. HOLMES.

With Plates xx, xxi.

Order DECAPODA.

Suborder BRACHYURA.

Family PINNOTHERIDÆ.

PINNOTHERES NUDUS sp. nov.

Carapax a little broader than long, subquadrate to orbicular in outline, convex, curving downwards towards all the margins; the surface is smooth and naked, and the regions not defined. Front deflexed, rounded, not protruding, the central portion continued downward as a triangular process between the antennules, while there are smaller triangular processes at the sides partly separating the orbits from the antennulary fossettes. Orbits ovate, the rather wide inner hiatus partly filled by the base of the antennæ; eye peduncles very short and stout, the cornea minute. Antennules oblique; the antennular fossettes communicate with each other beneath the front. Maxillipeds oblique, neatly fitting the buccal area; the meros broad, smooth, subquadrate, the outer margin produced into a broadly rounded laminate expansion; the penultimate joint is oblong, distally rounded; the last joint is spatulate, articulated near the base of and extending somewhat beyond the preceding one. Chelipeds moderate, smooth, nowhere furnished with spines or teeth; hands narrow, rather thick, and widest immediately behind the articulation of the dactyl; fingers nearly or quite as long as the palm, subconical, and not conspicuously dentate on the inner margins. The three anterior pairs of ambulatory legs are subequal; the fourth pair is smaller; all are smooth, little compressed, and have acute, nearly straight tarsi, those of the fourth pair being relatively longer and more slender than in the preceding pairs. The abdomen of the female is nearly circular in outline and covers the entire sternal surface. It is composed of seven segments, the fourth, fifth and sixth being subequal and larger than the others.

Two females collected by Dr. Anderson at Santa Cruz.

Breadth of specimen, 24 mm.; length, 20 mm.

Breadth of specimen, 19 mm.; length, 15½ mm.

The fingers in the specimens examined were partly covered by a very short, dense pubescence. The specimens upon which the foregoing description is based, together with several others described in this paper, were kindly loaned to me from the collection of the California Academy of Sciences by the President, Dr. Harkness.

CRYPTOPHRYS PUBESCENS sp. nov.

Carapax subpentagonal, convex, the median and cardiac regions tumid and separated from the hepatic and branchial by a sulcus; there is a slight depression between the gastric and cardiac regions and another behind the latter. Front slightly projecting and notched in the center. Antero-lateral margins not defined by a ridge;

pair of ambulatory legs; hand rather narrow, oblong, about as long as the preceding joints combined, somewhat compressed, and concave on the inner face; fingers about as long as the palm, subcylindrical, hooked at the tip and not dentate on the inner margin. Ambulatory legs subequal (the last pair a little shorter than the others), moderately slender, and somewhat compressed, the joints not unusually widened; the tarsi are rather slender, curved, and from one-half to two-thirds the length of the propodi. Abdomen of female rounded, slightly longer than broad, and covering the entire sternal area. The body and legs are covered with a uniform short, dense pubescence.

Length, 9.75 mm.; breadth, 10 mm.

Locality: Muleje Bay, Gulf of California.

One specimen from a vial containing a specimen of *Pinnotheres margarita* Smith, which it much resembles in form and pubescence. This species is very readily distinguished from *C. concharum* Rath. M. by the shorter, stouter, and less compressed ambulatory legs and the presence of the longitudinal sulci on the carapax, which are entirely absent in that species.

PSEUDOPINNIXA gen. nov.

Carapax much broader than long, the anterior margin nearly straight, the frontal process deflexed. Orbits nearly round. Antennules obliquely or transversely plicated, the fossettes communicating with each other beneath the front. Buccal area small, subtriangular. External maxillipeds with the ischium rudimentary, the meros large, triangular; palp three-jointed, the terminal joint joined to the tip of the preceding one. First pair of ambulatory legs the largest, the others successively diminishing in length, the last pair being quite small. Abdomen of female small, not nearly covering the sternal area.

PSEUDOPINNIXA NITIDA (Lock).

Pinnixa? nitida Lockington, Proc. Cal. Acad. Sci. vii, p. 155.

Carapax smooth, shining, a little over twice as broad as long, longitudinally convex, transversely plane, the sides evenly rounded; the anterior margin is straight; the front is broadly triangular, short, much deflexed, not at all projecting, and having a groove behind the margin. Orbits nearly as wide as long, the inner hiatus wide and partly filled by the base of the very minute antennæ. Antennules obliquely (nearly transversely) plicated. Epistoma very short, curved. Buccal area broadly subtriangular, rounded in front, the posterior portion covered by a projection of the sternum. External maxillipeds subtriangular, the ischium rudimentary; the meros is large and has the portion nearer the mouth bent inward at a considerable angle to the outer face; the first joint of the palp short and stout, the second oblong, the third very small. Chelipeds rather short, moderately stout, smooth; the meros is not much longer than the carpus; hand a little compressed, the palm thickened and provided on the outer surface with two longitudinal lines of ceding pair; the penultimate joint is relatively wider than in the preceding pairs; tarsus similar to the others. Abdomen of the female rather small, not covering one-half the sternal area, and seven-jointed; the segments gradually increase in width from the first to the third, then decrease rapidly in width to the last one, which is longer than the others, subtriangular in shape, but with a rounded apex. The sides of the posterior portion of the abdomen are concave.

Lockington, in his description of this specimen, says that the "color in spirits" is "bright orange," and the specimen still retains a decided orange tinge.

Length of carapax, 5 + mm.; width, 11 mm.

Locality: Angeles Bay, Gulf of California.

This species, together with the one here described as *Pinnixa tomentosa*, were both described by Lockington as *Pinnixa nitida* under the erroneous impression that they were the male and female of the same species. He evidently had some misgivings about their specific identity, for he says: "A single specimen of each of the two crustaceans just described was collected on the same day at the same locality—namely, Angeles Bay, Gulf of California—and the two were placed by the collector (Mr. W. J. Fisher) in the same vial. Had it not been for this, I should certainly have never linked together two specimens so distinct in the relative proportions of the limbs themselves, as well as of the joints of those limbs; one covered in many places with an abundant pubescence, the other smooth and shining above and below. The proportions of the ambulatory limbs of the female agree with the genus *Pinnixa*, but in the male the increase of size is transferred to the second pair. Should these crustacea prove to be distinct the female should be *Pinnixa tomentosa*, while the male must be placed in some other genus." An examination of these very specimens which are preserved in the collection of the California Academy of Sciences and from which our descriptions and figures are taken, has convinced us that they, indeed, belong to different genera. Moreover, the specimen Lockington considered to be a male is not a male at all, as an examination of the vulvæ and the appendages on the under side of the abdomen unmistakably shows. The abdomen is small for a female of this group, and Lockington probably did not lift it up and examine the ventral side, but concluded that the specimen was a male from the small size of that organ. As Lockington named the female *P. tomentosa*, in case it should prove distinct, this name should stand, since the supposed male belongs to a different genus.

PINNIXA TOMENTOSA Lock.

Pinnixa tomentosa Lockington, Proc. Cal. Acad. Sci. vii, p. 156.

Carapax very nearly twice as broad as long, smooth, and rounding off towards all the margins; the upper surface is somewhat flattened and there is a shallow deprespreceding one and projects a short distance beyond it. Chelipeds scarcely as long as the fourth pair; the meros trigonal, hand oblong, compressed, longer than all the preceding joints combined; fingers but little more than one-half the length of the palm; the pollex is wide but abruptly narrowed near the hooked tip; dactyl curved, toothless, subuncinate at the apex. Ambulatory legs compressed; the first pair shorter and more slender than the second; the tarsus is rather slender and about as long as the propodus. The second pair stands about intermediate in size between the first and third pairs; the tarsus is not quite as long as the propodus and is relatively stouter than that of the first pair. Third pair not greatly exceeding the second in length, the tarsus much shorter than the propodus and much stouter than the tarsus of the second pair; there is no flange or groove on the posterior margin of the meros. Fourth pair shorter and relatively stouter than the first ambulatory legs but reaching beyond the distal end of the meros of the third pair; tarsus short and stout. The fourth pair closely resembles the third in most points except size. Abdomen of female transversely elliptical and covering the entire sternal surface. The carapax and legs were covered with a very short pubescence.

Length of carapax 7.5 mm.; breadth, 14 mm.

Locality: Angeles Bay, Gulf of California.

PINNIXA TUBICOLA sp. nov.

General form subcylindrical. Carapax about two and one-half times as broad as long, strongly curved downwards towards the anterior margin and sides. There is a shallow, transverse depression behind the gastric region behind which is a convex (not crested), transverse intumescence, from which the carapax curves sharply downwards to the broad, slightly concave posterior margin. Front short, deflexed, and not projecting beyond the general contour of the carapax; it is furnished with a short median groove, but the transverse groove behind the anterior margin, which is so conspicuous in *P. longipes*, is slightly or not at all marked. Antero-lateral margins marked by a ridge along their distal portion which intersects the postero-lateral margin at somewhere near a right angle. Maxillipeds pubescent; the postero-internal angle of the meros is curved inward, and the distal portion of the outer margin is convex; penultimate joint of the palp oblong-ovate; the last joint is spatulate and is joined near the base of, and extends considerably beyond, the preceding joint; exopod rather broad, and bearing a rounded projection near the middle of the outer side, beyond which the margin is concave. Chelipeds rather small, shorter than the second ambulatory legs, meros much larger than the carpus; hand oblong, compressed, longer than the combined lengths of all the preceding joints; fingers a little over one-half the length of the palm; the tips of the fingers are hooked and their inner margins meet when men of the male wider at base than the exposed sternal area on either side and tapering from the third joint, beyond which the sides are somewhat concave, to the rounded tip; the first and second segments are short and subequal; the four succeeding segments are subequal in length; the last segment is much broader than long and evenly rounded.

Length of carapax, 4 mm.; breadth, 10 mm.

This species is usually found in the leathery tubes of annelids. The legs and portions of the carapax are covered with a short pubescence, but the upper surface of the carapax is usually naked and often marbled with patches of color. There are often two ridges which extend backward from near the middle of the antero-lateral margins to within a short distance of the posterior margin of the carapax. In some specimens these ridges are quite distinct but in others they are scarcely visible.

Numerous specimens from Trinidad, Cape Mendocino and Bodega Bay.

This species is closely allied to *P. tomentosa* L., but differs from it in the relatively greater width of the carapax which is naked and furnished with much larger punctations, in the much smaller chelipeds, in the more slender ambulatory legs with relatively longer and more slender tarsi. In *P. tomentosa* there is a curved line of small pits behind the gastric region, a character which is absent in our species.

PINNIXA LITTORALIS sp. nov.

Carapax naked, flattened above; behind the median region is a transverse depression followed by a transverse intumescence behind which the carapax curves strongly downwards to the slightly concave posterior margin. The front is not strongly depressed and projects beyond the general outline of the carapax; it is anteriorly truncated and furnished with a median groove but has no transverse groove behind the anterior margin. Antero-lateral margin marked by a ridge which begins near the orbit and runs outward and slightly backward to the side of the carapax where it curves abruptly backwards, becoming faintly marked towards its distal end. Maxillipeds nearly naked, similar in shape to those of *P. tubicola;* the last two joints of the palp are more or less grooved on the outer surface and the penultimate joint extends only a short distance beyond the preceding one. Chelipeds rather large, smooth, carpus much shorter than the meros; hand large, compressed, oblong, but widening slightly distally, and exceeding in length all the preceding joints combined; thumb short, edentulous, directed obliquely downwards and furnished at the tip with a notch into which the point of the movable finger closes; the movable finger is much longer than the thumb, edentulous, and curved so that when it is closed against the thumb a large rounded space is left between them. Ambulatory legs almost entirely naked, more slender than in *P. tubi-*

Locality: Bodega Bay; near Fort Bragg.

Some of the specimens were found in the holes of the common clam *(Mya)*, others were picked up on the shore. This species is easily recognized by its smooth, shiny appearance, its projecting front and large hands with the large gap between the fingers. There is no crest or groove on the meros of the third ambulatory legs either in this species or *P. tubicola*.

PINNIXA LONGIPES Lock.

Tubicola longipes Lockington, Proc. Cal. Acad. Sci. vii, p. 55.
Pinnixa longipes Lockington, Proc. Cal. Acad. Sci. vii, p. 156.
Pinnixa longipes Streets & Kingsley, Bull. Essex Inst. ix, p. 107.

Carapax considerably more than twice as broad as long, smooth, somewhat flattened above and furnished with a transverse depression behind the gastric region. Front slightly projecting and furnished with a groove just behind and parallel with the transverse anterior margin; there is also a short longitudinal median groove which becomes deeper toward the anterior margin of the frontal process. Antero-lateral margin rounded, usually marked by a more or less evident ridge, and meeting the concave postero-lateral margin at an acute angle. Posterior margin long and straight. The lower edge of the anterior margin of the carapax (not the antero-lateral margin proper) is furnished with long hairs. There is a ridge which runs from the outer end of the orbit downwards and outwards to the edge of the carapax. Orbits oblong, transverse. Antennulæ obliquely plicated. Maxillipeds oblique, furnished with long hairs, the meros large, nearly twice as long as broad, the outer margin convex; the penultimate joint is subovate; the last joint is broadly spatulate, joined near the base of and slightly exceeding the preceding one; the expod has the edges parallel and the outer distal angle concave. Chelipeds small, short, hairy;

hands oblong, compressed; fingers shorter than the palm. The first two pairs of ambulatory legs are slender (the second somewhat larger than the first) and furnished with slender, nearly straight tarsi which are about equal to the propodal joints. The fourth pair of pereopods is very large, considerably longer than the breadth of the carapax and about two-thirds as wide as the carapax is long; on the posterior margin of the meros is a kind of flange above which is a shallow groove; tarsus shorter than the propodus, stout, curved. The last pair is small and proportionately stouter than the anterior ambulatory legs, and has the edges densely hairy. This pair scarcely reaches beyond the middle of the meros of the preceding pair; the carpus and propodus are about as broad as long, the tarsus short and stout, similar to that of the fourth pair. All of the legs are compressed and more or less hairy. Abdomen of female transversely elliptical and seven-jointed. Abdomen of male seven-jointed, the first two joints shorter than the others, the last joint broader than long and rounded at the tip. The male abdomen tapers evenly from the base which is about one-third the width of the thoracic sternum to the last joint.

Suborder ANOMOURA.

Family LITHODIDÆ.

ACANTHOLITHODES gen. nov.

Carapax lyrate, flattened, and covered with setose spines. Rostrum rather prominent and terminated by strong spines. The first basal joint of the antennæ has one or more spines on the outer side; the second basal joint is produced forwards on the outer side into a long, pointed process whose outer margin is armed with several strong spines; there is a pointed, spiny, movable acicle which is joined to the end of the second joint above the base of the spiny process; the third basal joint is small and joined to the ventral side of the preceding one; the fourth and fifth joints are subcylindrical. The ischium of the third maxillipeds is widened, produced forward at the antero-internal angle and dentate on the inner margin; the last joints of the palp are not dilated. The legs are covered with setose spines; chelipeds of moderate size, more or less unequal, the fingers of one or both hands excavated within and furnished with calcareous teeth and corneous extremities. The first three pairs of ambulatory legs are subequal. Abdomen soft, the integument spiny; the first and the last two segments strengthened with calcareous plates. Type *Acantholithodes hispidus* (St.)

This genus is founded on the species described as *Dermaturus hispidus* by Stimpson (in Ann. N. Y. Lyc. Nat. Hist. vol. vii, p. 242). It differs from Dermaturus Brandt in the presence of spines on the body and legs, and in the large, spiny, prolongation on the outer side of the second joint of the antennæ, which is entirely absent in that genus.

Suborder MACROURA.

Family HIPPOLYTIDÆ.

HIPPOLYTE CALIFORNIENSIS sp. nov.

A long, slender species. Rostrum slightly longer than the carapax, slender, nearly horizontal, very slightly upturned, tapering uniformly to the tip; on the upper margin it is armed with three to five low, acute teeth, the points of which are directed forwards and slightly upwards; on the lower margin there are four or five similar teeth, the last one being so near the tip of the rostrum as to give it the appearance of being bifid. The base of the rostrum is rounded above and there is a spine on either side of it above and behind the ocular peduncles. On the upper part of the anterior margin of the carapax is a tooth below which is an acute spine. There is a convexity but no spine at the lower angle of the margin, but there is a prominent spine within the margin behind the base of the second antennæ.

Peduncle of the first antennæ about one-half as long as the rostrum, the spine at the outer side of the base flat-second joint has a laminate expansion on the inner side; the third joint equals or somewhat exceeds the last two and has the inner margin concave; the last joint is about twice the length of the preceding one and armed around the tip with nine to eleven spines.

The first pereopods are exceedingly short but stouter than the succeeding pairs; the carpus is excavated so as to receive the rounded lobe of the hand; the hand is broadened and thickened at the base where it is produced backwards into a prominent lobe; fingers excavated, their tips furnished with several small spines. Second pereopods slender, much longer than the first pair, but shorter than the third, the carpus three-jointed (the first joint the longest); hand slender, not half as long as the carpus, fingers excavated within. The last three pairs of pereopods decrease successively in length.

Abdomen slender, not at all crested or carinated; the postero-lateral angles of all of the segments except the last one rounded. Telson truncated and spinulous at the tip and furnished with a few spinules near the lateral margin.

Length of specimen, 38 mm.

Color, green.

Taken in Bodega Bay, July, 1894. The females were loaded with ova.

Family MIERSIIDÆ.

MIERSIA PACIFICA sp. nov.

Rostrum about as long as the carapax, slender, tapering uniformly to the tip; there may be either one or two spines on the upper side and on the under side the number of spines varied in the specimens examined from five to nine. The spines are less distant from each other near the base of the rostrum but there may be two close together near the tip or but one spine so situated that the rostrum may appear either trifid or bifid. The carapax is not crested in front. There is a supra-orbital spine and two spines on the anterior margin of the carapax the upper one of which is situated just below a short suborbital tooth. The antennules are provided with two long flagella which usually do not differ markedly in length; the outer flagellum presents a tolerably well marked division into a basal portion and a more slender and somewhat longer distal part. The first joint of the antennular peduncle is transversely hollowed out and furnished with an external spine which usually extends a little beyond the tip. The antennal scale reaches about to the tip of the rostrum and the flagella often exceed the length of the body. The mandibles are devoid of a palp and are divided (but not deeply so) into a molar process and a broad, thin, dentate cutting edge.

The maxillipeds do not reach the tips of the antennal scales but generally exceed the tips of the peduncles; the exopod may reach beyond the tip of the penultimate joint and always exceeds the third one; the last joint is one-third as long as the preceding joints, the lower margins spinulous. Telson tapering to a truncated or broadly rounded spinulous extremity.

Length of specimen, 5 cm.

Several specimens from Sonoma county, Cal. (L. E. Ricksecker).

Family PALÆMONIDÆ.

PALÆMON RITTERI sp. nov.

Carapax shorter than one-half the length of the abdomen, the anterior half or third crested. There is a spine beneath the angular suborbital projection of the anterior margin of the carapax, and on the margin below this is another situated behind the base of the second antennæ and above the rounded antero-inferior angle. No hepatic spine. Rostrum a little longer than the carapax, and tapering tolerably evenly from the widest portion (which is about one-fourth as wide as the rostrum is long) to an acute tip. The upper margin is armed with seven or eight teeth of which the posterior one is situated on the gastric region and the anterior one (often small) some distance from the tip. On the inferior margin of the rostrum are three teeth, the anterior one rather remote from the tip. Ocular peduncles short and stout; the ocellus lies between the cornea and the stalk. The first basal joint of the first antennæ is about twice as long as broad; the spine on the outer side reaching about to the middle of the joint; there is a small tooth at the antero-external angle. The next two joints are short and cylindrical; the inner flagellum is slender and rather long. Outer flagellum flattened and entire to a distance about equal to the length of the third joint of the peduncle where it divides into a slender, external portion which is longer than the internal flagellum and a short and closely annulated portion which is not greatly longer or shorter than the peduncle. The second antennæ are furnished with an oblong scale which is shorter than the rostrum; the flagellum is very slender and longer than the body. Mandibles with an oblong molar tubercle and a curved, somewhat tapering, dentate cutting edge and a three-jointed palp which is about as long as the cutting edge. Third maxillipeds reaching about to the tip of the peduncle of the second antennæ, and furnished with a slender exopod which is nearly or quite as long as the antepenultimate joint; terminal joint about three-fourths as long as the preceding one. First pair of chelipeds slender and not reaching beyond the tip of the rostrum; the carpus is very little longer than the preceding joint and bears no spine; hand but little over one-half the length of the carpus, slender, linear, the fingers straight and about as long as the palm. The second pair very little longer than the first and like them do not extend beyond the tip of the rostrum; the carpus is not one-half as long as the preceding joint and is nearly as long as the palm of the propodus. Hand slender, linear, slightly bent, the fingers nearly as long as the palm, nearly straight, the tips hooked.

chelipeds, and in the position of the ocellus which is not entirely separated from the cornea as described and figured by Spence Bate (Challenger Reports xxiv, p. 782, pl. cxxviii), nor situated in the cornea as in *P. squilla*, but is between the two.

Family PENEIDÆ.

PENÆUS CANALICULATUS Olivier.

P. canaliculatus Olivier, Encycl. Method. viii, p. 660. *P. canaliculatus* M. Edwards, Hist. Nat. Crust. ii, p. 414. *P. canaliculatus* Spence Bate, Challenger Reports xxiv, p. 242.

The three specimens we have of Penæus, one from southern California and two from San Francisco Bay, we refer without much doubt to the above species which is fully described and figured by Spence Bate in the Challenger Reports. It is probable that the species from the west coast of Nicaragua, described by Kingsley as *P. brevirostris* (Proc. Phil. Ac. Sci. 1878, p. 98) and subsequently referred by him to *P. Braziliensis* (l. c. 1879), should have been referred to *P. canaliculatus*, as the specimens we have agree very well with Kingsley's description. The two species are very closely allied and it is probable that they are mere geographical varieties. The specimens of *P. Braziliensis* we have seen have longer and more slender legs than our specimens, but the other differences are slight. *P. canaliculatus* was described from Japan and Australia, and varies considerably in the different localities in which it is found. *P. Braziliensis* is likewise very extensively distributed over both shores of the Atlantic Ocean.

Suborder SCHIZOPODA.

Family MYSIDÆ.

CALLOMYSIS gen. nov.

Carapax having a deep posterior sinus which leaves a portion of the pereon uncovered. Rostrum short. Eyes normal. Antennules with a setose lobe at the base of the outer flagellum; the sensory appendage usually found in the males of schizopods is absent. Antennal scale oblong, truncated, and ciliated on the inner and distal margins; outer margin naked and terminating in a spine. The gnathopods resemble the maxillipeds but have a larger endopod. The distal portion of the thoracic legs is divided into numerous articulations. Pleopods in the female rudimentary and biramous, the outer ramus smaller than the inner one. In the male the pleopods are small, biramous, the outer ramus of the third pair elongated; the fourth and fifth pairs short. Inner ramus of the uropods furnished with the usual auditory apparatus. Telson well developed, the margins spinous, the tip provided with an emargination in which are situated several spines. Marsupial pouch formed by two pairs of large lamellæ bears a setose lobe at the base. The peduncles of the antennæ are shorter than those of the antennules and have the last joint about as broad as long; the scale is shorter than the peduncle and extends as far forward as the tip of the penultimate joint of the antennules; the flagellum seldom exceeds one-half the length of the body. The mandibles have a molar tubercle and a dentate cutting edge; the second joint of the long palp is arcuate and longer and much broader than the third, which is slender and tapers to a subacute tip. First maxillæ normal. Second maxillæ with three oblong masticatory lobes and a subovate exognath which bears 13–16 marginal setæ; second joint of palp oblong-ovate.

Maxillipeds with broad basal joints; the exopod much longer than the endopod, the terminal portion divided into numerous (fifteen in specimens) articulations; the terminal joint of the endopod is rounded, thickly setose and devoid of a claw. The gnathopods closely resemble the maxillipeds but the endopod is larger and the terminal joint is subacute. The following pair of appendages has the endopods longer than the exopods; the terminal portion is longer than the preceding joint and divided, in several specimens examined, into ten to thirteen setiferous articulations. The remaining thoracic legs are similar to the pair of appendages just described.

Pleopods rudimentary in the female, mostly shorter than the width of the abdominal segments to which they are joined and bearing a minute outer branch. The first pair is longer than the others and bears two short, subequal rami at the tip of the relatively long peduncle.

In the male the first pleopods have an oval peduncle which is furnished with plumose setæ along the outer margin; the outer ramus is longer than the peduncle and is divided into several setiferous articulations; the inner ramus consists of a single, small, oblong joint which is shorter than the peduncle and bears several plumose setæ. The second pleopods are a little longer than the first pair, the inner ramus is shorter than the outer but like it divided into several joints. In the third pair the inner ramus is short but the outer one is long and slender and reaches back further than the penultimate abdominal segment; the terminal joints are much elongated but towards the base the annulations become closer. The fourth and fifth pleopods are subequal and a little shorter than the first two pairs; the inner rami are shorter than the outer and like them are divided into several setose articulations.

Uropods subequal in length and equaling or a little exceeding the telson. The inner one is a little narrower than the outer and subacute; the outer one rounded at the tip. Both are fringed on both sides with plumose setæ. Telson subrectangular, between two and three times as long as broad, each outer margin furnished with eight spines of which the terminal one is the largest. In the emargination at the apex are 10–13 slender spines which increase in length from the innermost one to the second or third from the outermost.

Order PHYLLOPODA.

Family APODIDÆ.

LEPIDURUS LEMMONI sp. nov.

Carapax oval in outline; the sides are furnished with numerous small teeth which begin near the rounded antero-lateral angles and become longer, more slender and more closely set towards the postero-lateral angles; the dorsal crest of the carapax is furnished with a variable number of unequally spaced spine-teeth which varied in the specimens examined from ten to fifteen. The posterior emargination of the carapax is furnished with from five to seven teeth (counting the terminal ones), the number of teeth on the two sides being often different in the same individual. The postero-lateral angles are nearly right angles. The eyes are usually reniform and their anterior ends lie near together. The inter-ocular tubercle is round, small, considerably elevated and located considerably behind the posterior margins of the eyes. Antennæ short, simple, smooth. Second antennæ absent. Labrum nearly square but with rounded angles. The maxillæ are deeply divided into an anterior lobe which is ciliated and a larger posterior lobe which is spinulous along its inner edge. The first pair of legs are of moderate length, none of the endites in the specimens examined reaching further back than the postero-lateral angles of the carapax; the second endite reaches but little beyond the base of the third which is considerably longer than the fourth; the fifth forms a short, pointed, ciliated scale; gill triangular.

In the second pair the second endite scarcely reaches the base of the terminal ones, the third is about two-thirds as long as the fourth; the fifth is about as long as the fourth, acutely pointed and finely pectinated on the inner edge. The eleventh pair of legs in the female are similar to those of *L. glacialis*. There are usually about five of the terminal abdominal segments exposed and nearly an equal number (sometimes less) which are devoid of appendages on the ventral side. The number of spines on the penultimate abdominal segment is never far from twelve. On the upper side of the last segment is a small, spinulous prominence in front of the base of each stylet. The telson is rather long, oblong, somewhat wider in the middle, and may be rounded, truncated (obliquely so in some specimens), or, in some cases, bilobed; the margins are furnished with several minute spinules, and there are, in most of the specimens, two spines in the middle line at the base, but in one specimen there were three spines at the base and a small one near the middle. Except where the teeth are situated, there is no median ridge or carina, as in *L. Cousii*. The caudal stylets are minutely spinulous and are longer than the body including the telson.

Length, 28 mm.

Color (in alcohol), greenish.

the caudal stylets and in several differences in the relative proportion of the parts of the appendages. Judging from the measurements of the species described by Packard, this is the largest of the North American species.

NOTE.—After the first part of the present article had been printed, I found that Ortmann had recently employed the name *Pseudopinnixa* for a genus of Pinnotheridæ, which is the same name that I proposed for an allied genus of the same family. I propose, therefore, to change the name of my genus to PARAPINNIXA.

EXPLANATION OF FIGURES.

PLATE XX.

Fig. 1. Pinnotheres nudus, outline of carapax.
Fig. 2. Pinnotheres nudus, abdomen of female.
Fig. 3. Pinnotheres nudus, 3d maxilliped.
Fig. 4. Pinnotheres nudus, chela.
Fig. 5. Pinnotheres nudus, 1st ambulatory leg.
Fig. 6. Cryptophrys pubescens, general outline.
Fig. 7. Cryptophrys pubescens, buccal area.
Fig. 8. Parapinnixa nitida, general outline.
Fig. 9. Parapinnixa nitida, 3d maxilliped.
Fig. 10. Pinnixa tomentosa, 3d maxilliped.
Fig. 11. Pinnixa tomentosa, chela.
Fig. 12. Pinnixa tomentosa, 1st ambulatory leg.
Fig. 13. Pinnixa tomentosa, 3d ambulatory leg.
Fig. 14. Pinnixa littoralis, chela.
Fig. 15. Pinnixa littoralis, front.
Fig. 16. Pinnixa littoralis, 3d ambulatory leg.
Fig. 17. Pinnixa tubicola, chela.
Fig. 18. Pinnixa tubicola, 3d ambulatory leg.
Fig. 19. Pinnixa longipes, general outline.
Fig. 20. Pinnixa longipes, 3d maxilliped.
Fig. 21. Hippolyte californiensis, outline of carapax.
Fig. 22. Hippolyte californiensis, 2d chela.
Fig. 23. Hippolyte californiensis, 2d cheliped.
Fig. 24. Hippolyte californiensis, 3d maxilliped.
Fig. 25. Hippolyte californiensis, 1st cheliped.
Fig. 26. Hippolyte californiensis, mandible.

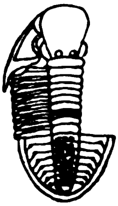
PLATE XXI.

Fig. 27. Miersia pacifica, rostrum.
Fig. 28. Miersia pacifica, carpus and hand of 2d cheliped.
Fig. 29. Palæmon Ritteri, 2d cheliped.
Fig. 30. Palæmon Ritteri, 1st cheliped.
Fig. 31. Palæmon Ritteri, mandible.
Fig. 32. Palæmon Ritteri, 3d maxilliped.
Fig. 33. Palæmon Ritteri, carapax.
Fig. 34. Palæmon Ritteri, eyestalk.
Fig. 35. Palæmon Ritteri, antenna.
Fig. 36. Callomysis maculata, side of carapax.
Fig. 37. Callomysis maculata, dorsum of carapax.
Fig. 38. Callomysis maculata, telson and uropods.
Fig. 39. Callomysis maculata, antenna.
Fig. 40. Callomysis maculata, antennule.
Fig. 41. Callomysis maculata, mandible.
Fig. 42. Callomysis maculata, 1st pleopod of female.
Fig. 43. Callomysis maculata, 1st pleopod of male.
Fig. 44. Callomysis maculata, 3d pleopod of male.
Fig. 45. Lepidurus Lemmoni.
Fig. 46. Lepidurus Lemmoni, 1st leg.
Fig. 47. Lepidurus Lemmoni, maxilliped.
Fig. 48. Lepidurus Lemmoni, 11th leg of female with the ovigerous sack.
Fig. 49. Lepidurus Lemmoni, 2d leg.

NOTES ON PALÆOZOIC CRUSTACEA NO. 4.—ON A NEW TRILOBITE FROM ARKANSAS LOWER COAL MEASURES.

BY A. W. VOGDES.

GRIFFITHIDES ORNATA sp. nov.


Griffithides ornata.

The only specimen of this new species was discovered in Conway county, Arkansas, and consists of a head shield which is unfortunately not quite perfect, only exhibiting the right side and part of the glabella, with portions of the thorax and an entire pygidium; but it shows sufficient new characters to authorize us in considering it as a new species.

The head shows that the latero-posterior angles are produced into short spines extending to about the third segment of the thorax, the glabella is pyriform, gibbous in front, and destitute of lateral furrows; basal lobes prominent. The posterior border of the glabella has two small round nodes. The cervical lobe is broad and well marked, much broader than the axal lobes.

The thorax exhibits imperfectly parts of the pleuræ and also the axis. Thorax with nine segments. The axis shows a series of nodes running through the center of each ring. The pleuræ are smooth, each plural groove extending slightly beyond the fulcral point; the extremities are probably rounded, but this is not indicated by the imperfect specimen now before us.

The pygidium exhibits both in the axis and lateral lobes distinct segmentation. The axis does not extend to the posterior margin. The entire pygidium is surrounded by a marginal border, which widens out slightly anteriorly.

The tail is parabolic in form, very convex and not as broad as the head, measuring on its anterior border 12 mm. The axis is broad, conical and prominent, occupying a little less than one-third the width of the tail on the anterior margin. It is marked with eleven rings; these become smaller and smaller and end in an obtuse point. Each ring is distinctly ornamented along the center by a series of nodes, arranged into three double rows of two each. The sides of the axis are smooth.

The lateral lobes are slightly flattened on top to the fulcral point. They are marked with seven pleuræ; the grooves between the pleuræ are deep and distinct, each being rounded on top and ornamented with a single node at the fulcral point; here they bend suddenly and join the marginal border.

Locality and position: Lower Coal Measures, T. v N., R. xvi W., Sec. 17, near center of northwest quarter of the section, Conway county, Arkansas. From the collection of the Geological Survey of Arkansas, now at Stanford University.

Affinities and differences: This species in some of its features resembles *Phillipsia Rœmeri* Möller, Ueber die Trilobiten Steinkohlen formation des Ural, pl. ii, fig. 17, especially in the markings of the tail, which shows seven is not depressed or nearly flat, but convex. Secondly, the ornamentation of the axis is entirely different, so much so that it would not warrant its reference to the Illinois species.

It is doubtful in our present state of knowledge whether *Phillipsia (Griffithides) scitula* M. & W. should not be referred to the older name of *Phillipsia Cliftonensis* Shumard, from the Upper Coal Measures, Clifton Park, Kansas, described from a pygidium. Dr. Shumard says that the axis has from 13 to 14 subgranulose rings and seven side segments. A thorough study of all these allied species may necessitate their reference to the older name; but for the present it would be advisable to give the Arkansas species a new name on account of the ornamentation of its tail.

DESCRIPTION OF EVERMANNIA, A NEW GENUS OF GOBIOID FISHES.

BY DAVID STARR JORDAN.

The species of fish described by Jordan and Gilbert from Mazatlan, under the name of *Gobiosoma zosterurum* (Proc. U. S. Nat. Mus. 1881, 361) seems to be the type of a distinct genus, allied to Gobiosoma, but distinguished by its slender body and especially by its short first dorsal which contains but four spines, the anterior being filamentous. For this genus I propose the name of EVERMANNIA, in honor of my former student and later scientific associate, Dr. Barton Warren Evermann, now ichthyologist of the U. S. Fish Commission, in recognition of his work on the fishes of the Gulf of California. The genus Evermannia may be thus defined:

Evermannia Jordan, gen. nov. Gobiidæ; type *Gobiosoma zosterurum*, Jordan and Gilbert.

Body slender, compressed behind, entirely naked. Head long, slender. Snout rather pointed; mouth moderate, terminal, the maxillary not produced backward; teeth small and slender, the outer above slightly en-

ON THE DIPTERA OF BAJA CALIFORNIA, INCLUDING SOME SPECIES FROM ADJACENT REGIONS.

BY C. H. TYLER TOWNSEND.

The material described and identified in the following pages, which is mostly from the very interesting region of Lower California, was sent to me for study by the California Academy of Sciences. Type specimens of all the new species herein described are contained in the collection of the Academy. Most of the material was collected by Dr. Gustav Eisen, the remainder having been secured by Mr. Chas. D. Haines and others.

Some very interesting forms were found in the Lower California material, of which perhaps the most important are four species of Rhaphiomidas, while the whole is of much interest as coming from a region which is hardly known as yet dipterologically.

SIMULIDÆ.

1. SIMULIUM CINEREUM Bellardi. El Taste, Cape Region, Baja California (Eisen). September. Seven females. These agree well with description, and are undoubtedly this species. The antennæ are rather brownish than black, however; and the thorax is often more or less rufous on dorsum.

BIBIONIDÆ.

2. DILOPHUS STYGIUS Say. Compl. Wr. ii, 352. San José del Cabo, Baja California (Eisen). October. Thirteen females. El Taste, Baja California (Eisen). September. Eight females and six males. The females agree with Say's description, and I believe should be referred to this species. The males are smaller, with much smaller wings in proportion, and the wings are whitish except the small black stigma. The female is

2D SER., VOL. IV. April 8, 1895.

entirely black, wings and all. The males have the same thoracic and front tibial spines as the females.

PSYCHODIDÆ.

3. Psychoda sp. Marin county, Cal. (Haines). A single specimen in too poor condition for determination.

STRATIOMYIDÆ.

4. Hermetia aurata Bellardi. San José del Cabo, Baja California (Eisen). September. Thirty-four specimens. These I refer all to this species. They are very uniform in size. All but one are about 11 mm. long, and that one is 9 mm. The abdomen is of a yellowish-brown color, with first segment blackish, and other segments clothed with the short golden pubescence except a bare spot on lateral edge of each.

5. Hermetia eiseni n. sp.

Three specimens, measuring 9 to 14 mm., have the abdomen blacker, and the golden pubescence absent from anterior half of fourth segment and anterior two-thirds or more of second and third segments, these areas being dark brown and uniting the lateral spots of the segments.

imen referred by O. S. to *H. aurata* in the Biol. C.–A., Dipt., seems to come close to this form. The large specimen (14 mm.) is from San José del Cabo, and the others are from El Taste.

ACANTHOMERIDÆ.

6. ACANTHOMERA CHAMPIONI Osten Sacken, Biol. C.–A., Dipt. i, pp. 67–8. Costa Rica (W. Gierisch). One female. Length, 45 mm. to end of 7th segment. The two broader velvety black vittæ of thoracic dorsum are continued on the sides of scutellum and meet on the hind border, thus forming a velvety black margin to the scutellum. The latter is not yellowish pruinose at base. First abdominal segment is velvety black on front border, as well as behind. The fifth segment is fully one-third the width of fourth. The first and second antennal joints are shining, but the third is opaque with more of a dull grayish cast. The facial tubercle is moderately prominent. In all other particulars agreeing with Osten Sacken's description, except that the shining spot of middle of thoracic dorsum is nearer the scutellum (where the pin enters), and is perhaps produced by the entrance of the pin.

The lateral edges of third and fourth segments are sharp and ciliate. There are apparently no hind femoral spines, but the face has a very distinct rounded-conical tubercle just below base of antennæ. Palpi are normal, sublinear.

TABANIDÆ.

7. SILVIUS GIGANTULUS Loew. Lake Tahoe, Sierra Nevada, Cal. (C. Troyer). Two females. They measure 8½, and nearly 9 mm. The abdomen in both is of an even deep yellow hue, with a faint tinge of orange. The basal segment of the abdomen has the transverse double cinereous marking, but there are no traces of cin-

ereous on the second segment. No dark spot on venter. Facial, frontal and ocellar callosities perfect.

8. APATOLESTES COMASTES Will. El Paraiso, Baja California (Haines). May. Five females. Rancho Viejo, B. C., April, one ♀. I refer these somewhat doubtfully to this species. Their length is 10 mm. They agree quite well with Williston's description. The tibiæ are rather brownish which may be due to bad preservation, and the cross-veins are hardly clouded.

9. APATOLESTES (or nov. gen.) EISENI n. sp.

San José del Cabo (Eisen). One ♂. Length, 7½ mm. Wholly blackish. Thorax with a slight whitish bloom. Scutellum and abdomen shining blackish brown. Legs black. Wings quite evenly and very decidedly smoky, a little lighter in the neighborhood of anal angle. Eyes contiguous for a long distance, flattened anteriorly, face short. Antennæ rather slender, not long, brownish, first joint short, second still shorter; third not like Apatolestes, but composed of only five annuli, the basal one swollen and rather bead-like, as thick as first and second antennal joints, while the remaining annuli are slender.

the antennæ, those of the male being slightly darker, but the first two joints of ♂ antennæ are no shorter than those of female. I therefore believe that the ♂ specimen described by Williston under this name belongs to another species. Williston does not mention the color of the scutellum, which is black. The males have thorax blacker, and more black on median portions of first two abdominal segments.

11. THERIOPLECTES COMASTES Will. Rancho Viejo, Baja California (Haines). April. Three females. Baja Purisima, B. C., April. One ♀. I refer these to this species rather than to *T. phænops* O. S., because they have the antennæ largely reddish. There is no trace of cloud on the furcation of third vein. Two specimens have the red of sides of abdomen much more extensive than have the others. The first two antennal joints and base of third are reddish. Length, about 15 mm.

12. THERIOPLECTES PHÆNOPS O. Sack. California (probably near San Francisco). Six females and one male. Antennæ wholly black. In the male the median black stripe on abdomen is not so jagged but more even on the edge, and the rufous does not extend on the fourth segment. One of the females agrees with it in this respect. Wings with a hardly perceptible trace of a brown cloud on furcation of third vein. Length, 13–14 mm. One of the females shows a peculiar deformity of the abdominal segments.

13. TABANUS ÆGROTUS O. S. Sierra county, Cal. One female, length, 21 mm., I refer to this species.

14. TABANUS LINEOLA Fab. California (probably near San Francisco). One female.

El Taste, B. C. (Eisen). Two ♀. September. Length, 11½ to 14 mm.

15. **TABANUS PUNCTIFER** O. Sack. San José del Cabo, Baja California (Eisen). Two females. Length, about 18 mm. The front, thorax and scutellum are denuded in both, and in one the frontal callosity is in consequence not distinguishable, being concolorous with rest of front. The denuded thorax and scutellum are of a brownish red.

El Taste, Baja California (Eisen). September. Four females and one male. San Ignacio, B. C., April, two females (Haines). San José del Cabo (Eisen), September, one male.

ASILIDÆ.

16. **STICHOPOGON TRIFASCIATUS** Say. San José del Cabo, Baja California (Eisen). Four specimens. The second, third, fifth and sixth abdominal segments are velvety opaque black, except the narrow laterally widening front borders which are covered with the silvery bloom of the rest of the abdomen.

17. **PROMACHUS** n. sp.?

San José del Cabo, Lower California (G. Eisen). One female. It seems to most nearly approach *P. magnus* who has seen the type, is inclined to refer his females to that species.

19. ERAX CINERASCENS Bellardi. San José del Cabo, Baja California (Eisen). Twenty-seven females and one male. Osten Sacken warns us not to confound this species with the Mexican *E. tricolor* Bell., which has black hairs in its mystax. All of the above specimens have the mystax wholly whitish or yellowish. But the twenty-seven females were taken in company with the large number of males mentioned under *E. tricolor*, and all of which had black bristles in the mystax. Only one male was taken with a wholly whitish or yellowish mystax, which makes it seem very improbable that this and *tricolor* are distinct species, yet they may be so.

20. ERAX TRICOLOR Bellardi. San José del Cabo, Baja California. September. Twenty-two females and thirty-eight males. These specimens all agree in having black bristles in the yellowish-white mystax. Otherwise they do not differ at all from *E. cinerascens* Bell., and both forms occur extensively in company with each other.

21. PROCTACANTHUS ARNO n. sp.

San José del Cabo, Baja California (Eisen). Eleven females and ten males.

Length, ♀, 31–38 mm.; ♂, 25–32 mm. Antennæ and eyes blackish, front with black hairs, and some white at anterior angles; face yellow, cheeks dark, the whole with white beard extending on occiput. Thorax brownish ashy, with a median pair of distinct dark brown vittæ which are attenuated posteriorly. Humeri somewhat lighter, with a whitish pollinose area behind them along sides of thorax. Pleuræ and sternum grayish with grayish hair. Abdomen more or less grayish or ashy on basal half and with grayish hair, chiefly on first to third segments, the dorsum of segments blackish. Second and third segments, especially in the female, more or less faintly reddish on sides, other segments more broadly and distinctly so, the black of dorsum of segments being well defined and widening posteriorly. The red is often indistinct and more or less absorbed in the male. Hypopygium a little elongate, ovipositor not large. Legs reddish, with a quite even black tinge on the outer surface. Macrochætæ black, pulvilli yellowish. Wings very faintly and evenly tinged with smoky.

22. PROCTACANTHUS ZAMON n. sp.

San José del Cabo, Baja California (Eisen). Twenty females and thirty-seven males.

♂ ♀. Length, 21 to 27 mm. A stout species with large thorax. Head blackish, front with black hair; face more yellowish, with long pale yellow beard, extending on the cheeks. First antennal joint black; second and third brown, subequal, shorter than first, style longer than antennæ. Thorax soft brownish black, with an indistinct pair of median vittæ, having a narrow reddish line be-small and spinose, hypopygium small. Legs chestnut brown, with black hair and black macrochætæ, the hind tibiæ conspicuously yellowish with yellow hair, the hind tarsi pale brownish. Pulvilli broadly yellowish on borders. Wings subhyaline, very evenly tinged with smoky.

APIOCERIDÆ.

The collection contains no less than twenty specimens of Rhaphiomidas! Baja California seems to be the home of this remarkable genus, especially the Cape Region of the peninsula. Four species are represented in the material, of which I describe two as new. In a third I recognize *episcopus* of Osten Sacken (but not of Coquillett). The fourth is *acton* Coqll. The following table will serve to separate these four species:

Table of Species of Rhaphiomidas.

1. Abdomen wholly black; wings with a smoky tinge, antennæ blackish. *episcopus* O. S. (non Coqll.)
Abdomen not entirely black; wings hyaline, antennæ yellowish or reddish at least on third joint. 2
2. Abdomen almost wholly yellow. *xanthos* n. sp.
None of the abdominal segments entirely yellow, the second to fourth each partly yellow and partly blackish. 3
3. Ground color of abdomen yellowish, only the front border and a median spot on second to fourth segments blackish; bristles of legs and scutellum yellowish. *acton* Coqll.
Ground color blackish, only the hind border of second to fourth segments yellowish; bristles of hind border of scutellum and of middle and hind legs blackish. *mellifex* n. sp.

These forms are of much interest in view of the long disputed question as to the systematic position of Apiocera and the allied genera, and as to whether the group should be given family rank. I have examined none of the genera other than Rhaphiomidas, but I can give my opinion upon the latter. After an examination of this material and a study of Dr. Williston's able résumé and discussion of the subject, including his investigations of the mouth parts (Kans. Univ. Quart. i, pp. 101–118), I am quite prepared to accept the family Apioceridæ. There seems an abundance of difference between this family and the Asilidæ on the one side and between it and the Mydaidæ on the other. These differences are certainly more in favor of the Asilidæ than of the Mydaidæ, though they are too great to admit of uniting them in the same family.

The small cross-vein on the posterior margin of the wing (between the anal cell and the tip of wing) is distinct and well developed throughout in all my specimens of *xanthos*, *mellifex* and *acton;* but it is atrophied terminally in both specimens of *episcopus* (see description of that species). It should also be noted that the apical style of third antennal joint is minute in all the species, almost microscopical.

23. RHAPHIOMIDAS ACTON Coquillett. Sonora, Mexico (Eisen). One male. It agrees in every particular with Mr. Coquillett's description (W. Am. Sci. vii, pp. 85–6), except that the hypopygium is more than one-half as long as abdomen. (Abdomen measures 9 mm.; hypo-

hardly apparent. Each occupies the lateral anterior angle of the dorsal sclerite of the segment. Hypopygium is entirely blackish. Palpi brownish, clothed with yellowish-white bristles. Venter yellowish. All the femora blackish, but yellowish at tips, the hind pair more narrowly so; tibiæ and tarsi wholly whitish yellow.

The bristles of hind border of scutellum are clear yellowish. Hypopygium is clothed with short yellowish pile. Antennæ are blackish or brown, third joint reddish. In both *mellifex* and *acton*, as well as *xanthos*, the macrochætæ of antennæ are yellow, while in *episcopus* they are blackish.

24. Rhaphiomidas episcopus Osten Sacken (non Coquillett). Baja California, September (Eisen). Two specimens, ♂ ♀, San José del Cabo.

Length, 20–21 mm., excluding antennæ. After studying Osten Sacken's description and Coquillett's notes, with the material before me, I have no hesitation in saying that Coquillett did not possess *R. episcopus* O. S., but that the species which he so identified is a new species which I describe below as *R. mellifex*. *R. episcopus* has no yellow whatever on the abdomen in either sex. Coquillett's statements that the ♂ of *R. episcopus* has the last three abdominal segments destitute of black pile, and that in both sexes each abdominal segment is bordered posteriorly with yellowish, show that he had *R. mellifex* under observation.

The male of *R. episcopus* has yellowish pile on the first abdominal segment only (also on the thorax, occiput, front, face, and front coxæ); the rest of the abdominal segments, especially the last three even including the hypopygium at base, having black pile. The female has segments one to four bordered with yellowish pile, less conspicuous in the middle of fourth. Antennæ in both sexes are blackish, third joint slightly reddish. Thorax blackish in ground color, grayish pollinose, showing a median approximated pair of dark vittæ abbreviated posteriorly. The middle and hind coxæ, especially in the female, are also yellow pilose. The hypopygium is not nearly so large as in *R. acton*, about same size as in *R. xanthos*. The middle and hind legs of male are almost wholly blackish, the tarsi being brownish and the pulvilli yellowish; the middle tibiæ are also somewhat brownish. The front tibiæ and tarsi, however, are brownish yellow with pile of the same color. Macrochætæ of legs all black. The female has the middle tibiæ and tarsi more yellowish, and the front tibiæ and tarsi still more so, the latter with some of the macrochætæ yellowish. Macrochætæ of margin of thorax and scutellum blackish in both sexes. In the right wing of the male the small cross-vein of posterior margin is represented only by the merest stump, and is abbreviated and attenuated in the other wing and in both wings of the female. The ocelli are concave and pollinose. This species may be known by the smoky tinge of its wings, the wings in the other species being perfectly clear.

of Rhaphiomidas. The bristles of posterior angles of thorax are, as a rule, yellowish, but sometimes somewhat blackish; those of hind border of scutellum, however, are blackish in all of my specimens. The ground color of whole body is blackish, thorax and scutellum gray pollinose, leaving a pair of closely approximated dark vittæ abbreviated behind. Abdominal segments two, three, and four are bordered on about posterior one-third with yellowish, the yellow widening laterally on second. First segment very narrowly yellowish on hind border, especially laterally. Legs colored as in *acton* (pale or yellowish, the femora except tips darker), macrochætæ of middle and hind legs blackish or brown, those of front legs yellow. (In *acton*, the macrochætæ of the legs are entirely yellow.) The last three segments of abdomen are more or less yellow in ground color, but appear blackish from being clothed with the short, appressed, anteriorly directed, black hairs. Pile of rest of abdomen whitish or yellowish. Wings clear. Antennæ yellowish, third joint more or less reddish, sometimes the basal joints brownish. Pile of thorax, occiput, face, front, coxæ, and sternum yellowish, that of latter more whitish. The middle and front tibiæ and tarsi are clearer and lighter yellowish than those of hind legs. Length, 21 to 26 mm.

Although my six specimens are all females, and my eleven specimens of *xanthos* are all males, and moreover both were largely collected at the same time and place, still I do not believe that I am describing two sexes of the same species. The sexes of Rhaphiomidas appear to closely agree in coloration. Coquillett assures us that the sexes of *acton* are alike in coloring. Besides, *xanthos* comes much nearer to *acton* in coloring than it does to *mellifex*, and we know that it can not be the male of *acton*. From *mellifex* it further differs in the macrochætæ of scutellum (and middle femora) being yellow.

26. RHAPHIOMIDAS XANTHOS n. sp.

San José del Cabo, Lower California (Eisen). One male. Length, 21 mm.; of wing, over 17 mm.

Differs from *R. acton* as follows: Abdomen entirely orange-yellow, only the base of first segment and the base and a median triangular cloud of second segment blackish. Hypopygium about one-fourth as long as abdomen. Macrochætæ of femora mostly black, especially of hind femora.

Differs from *R. episcopus* (besides in above characters) as follows: Bristles of posterior angles of thorax and scutellum yellow. Abdomen shorter than wings. Segments 5, 6 and 7 together not longer than third.

The hypopygium is concolorous with the abdomen, orange-yellow, with a hardly darker or reddish tinge.

The front is narrower than in the male of *acton*, especially at the vertex. In *acton* (♂) the front is but slightly widened anteriorly near antennæ. In *xanthos* (♂) the front widens quite evenly from vertex to base of antennæ, being fully twice as wide anteriorly as at vertex. Antennæ and legs entirely orange-yellow, with a reddish received, in a second lot of material from the Academy, ten additional specimens, all males, from San José del Cabo. They vary from 17 to 22 mm. in length. The whole body is yellowish pilose, and the macrochætæ are wholly yellow except those of hind legs black. The thorax is blackish in ground color, grayish pollinose, leaving a median pair of geminate dark vittæ abbreviated behind, and a widened tapering vitta on each side reaching scutellum. Sometimes there is a faint trace of black on median anterior portion of third abdominal segment. The hypopygium is uniformly short and much smaller than in *acton*.

This species seems to mimic, in general appearance, the large asilid with yellow abdomen described in this paper as *Proctacanthus zamon*, which is very common in the southern portions of Baja California. The resemblance is very striking.

ACROCERIDÆ.

27. PTERODONTIA VIX n. sp.

Southern California. One specimen. Length, 5 mm.; of wing, 5 mm.

I do not believe that this can be *Pt. misella* O. Sack. Williston states in his characterization of the family that the eyes are contiguous in both sexes. Yet (in Trans. Am. Ent. Soc.) he later states that he has specimens of *Pt. misella*, which Osten Sacken says is very like *Pt. flavipes*, differing only in size and the coloring of the abdomen. Now, Macquart figures and describes *Pt. flavipes* as having a very widened head with widely separated eyes, and the costal dilatation of the wing and its venation are very different from what is found in the present specimen. If Macquart's description of *Pt. flavipes* is correct, and he says he figures the type described by Gray in Griffith's Animal Kingdom, then the present species is entirely different from *Pt. misella.*

It may be recognized by the following characters: Entirely black, except the irregular posterior half of abdomen, the venter, the front legs, and the tibiæ and tarsi of the middle and hind legs. The venter and the light portions of legs are yellowish, the front femora being dark basally. The posterior portions of abdomen are orange-yellow, being the sides of second segment, and all of third, fourth and fifth (anal) segments except a median black stripe on third, which is much widened anteriorly where it joins the black of anterior portions and less widened posteriorly, and a median black spot at base of fifth. In the red of sides of second segment there is a triangular black spot, whose edge is identical with posterior border of the segment.

The head is hemispherical, mostly taken up with the contiguous eyes, which are very pilose. The costal dilatation of wing is very pronounced and obtuse or swollen in outline, with the short but stout tooth on the outer posterior border of swelling. The tegulæ are smoky, with brownish yellow. Thorax and scutellum, and lower pleuræ, brownish black. Legs yellowish brown, tarsi darker. Head black, thorax with short yellowish pubescence. Tegulæ obscure whitish, or with a fuscous tinge, possessing a well-defined narrow dark brown border. Knob of halteres brown. Abdomen brownish, hind borders of segments yellowish white. Wings subhyaline, costal margin brown distally and more yellowish basally.

This species differs from *O. pallidipennis* Lw. in the blackish scutellum, yellowish outer humeral callosities and pleuræ, and more distinctly margined tegulæ. From *O. melampus* Lw., it differs in the yellowish humeral and prescutellar callosities, yellowish pleuræ and much smaller size and lighter coloring.

The notes on the following two species of Oncodes collected by myself, are introduced here by kind permission of the Academy, while on the subject of this family.

30. ONCODES MELAMPUS Loew. San Francisco Mt., Arizona. One specimen taken in fir zone, July 15. It agrees well with Loew's description. Wings hyaline, tegulæ watery white and blackish margined. Wing veins brown. Legs brownish black. Length, about 6 mm.; of wing, 6½ mm.

This species was described from California.

31. ONCODES PALLIDIPENNIS Loew. Dixie Landing, Va., May 25, a very light brownish yellow specimen; and Washington, D. C., June 1, a normal brown specimen. The lighter yellowish specimen is apparently only an immature individual.

I refer these somewhat doubtfully to this species on the distinctions given by Loew (Centur., vi, 32), otherwise I would be inclined to refer them to *O. dispar* Macq. The tegulæ are more whitish than yellowish, very narrowly and faintly fuscous marginate, the halteres are black except the pallid stalk, and the wings have no stigmal spot, but the two costal veins are brown distally. The small humeral callosities are yellowish, and the scutellum and prescutellar callosities are brownish yellow. I mention these points because Osten Sacken states in the Biol. Centr.-Am., Dipt. (i, p. 165), that *O. humcralis* O. S. and *O. incultus* O. S. are the only North American species of the genus with the humeral callosities of a paler color than the thorax. Outside the small yellow anterior callosities, and adjoining them, there are much larger dark brown humeral callosities.

SYRPHIDÆ.

32. MICRODON VIRIDIS n. sp.

San José del Cabo, Baja California (Eisen). One female.

Length, 7 mm. Bright green. Face and front brilliant bright green, the latter with a slight bluish reflection. Face with dense whitish pile, front with less dense blackish pile. Antennæ brown, first two joints somewhat shining, third joint with an opaque whitish bloom in certain cidedly incrassate. Wings nearly clear, some of the cross-veins slightly yellowish infuscated.

This species wonderfully resembles a small green bee.

33. MICRODON XANTHOPILIS n. sp.

California. Two specimens, ♂ ♀. Length, about 11 mm. Pile of whole body is brassy yellow, in the ♂ almost orange yellow. Antennæ brown, first joint fully as long as second and third together. Head, thorax, scutellum, and first two abdominal segments shining metallic green; rest of abdomen brown, fourth segment of ♀ nearly as long as preceding two, in ♂ much longer. Spines of scutellum not prominent. Legs brown, short golden pilose. Hind metatarsi but little swollen in either sex, as long as next two joints. Wings uniformly slightly smoky. Pile of face, front, thorax, scutellum, and base of abdomen thicker and longer than on rest of abdomen.

It differs from *megalogaster* Snow by the golden pile of abdomen, and brown coloring of latter. It is more nearly related to *megalogaster* than to *bombiformis* Towns., which is a stouter and larger species than either. In the right wing of the ♂ the stump of vein normally found in first posterior cell is absent.

34. CHILOSIA n. sp.?

Marin county, Cal. (Haines). One male. Length, 9½ mm. Abdomen opaque black, first segment shining black; narrow anterior border entire of second, third, and fourth segments dark metallic shining green. These green cross-bands are the only difficulty in the way of locating the specimen in this genus, with which it agrees in all other characters. It cannot be placed in Melanostoma, as the arista is plumose.

The thorax and scutellum are blackish green. Antennæ reddish brown, third joint largely yellowish on basal half or more. Face entirely greenish black. Wings clear, stigma yellowish. Legs black, tibiæ and tarsi more or less yellowish, the anterior and middle pairs almost wholly so. Scutellum with marginal bristles, abdomen moderately hairy.

35. Syrphus opinator O. Sack. California. One female. It agrees in all respects with Osten Sacken's description of the females which he referred to this species (as quoted by Williston in Monogr.) The metallic green portion of the front is dusted with brassy yellow pollen only posteriorly and laterally, leaving a dark shining crescent on the front border, concave anteriorly. Length, 10 mm.

36. Volucella estebana n. sp.

San Esteban, Baja California, Mexico (Cal. Acad. Sci.). April, 1889. A pair, ♂ ♀, *in coitu*. Length, 7½ mm.

Small, light colored except head and thorax. Face and front pale whitish yellow, median vitta of face well defined and rather narrow, with stripe of cheeks black or dark brown. Front of female black across ocelli, near oring of the two segments coalescing on each side into a kidney-shaped marking. Fourth segment in female reddish-brown, with three blackish spots; in male reddish, dark in middle, and pale on sides anteriorly. Hypopygium brown. Venter of female broadly yellow on all basal region, brown apically and slenderly on median line; of male brown on base, yellow on each side, and brown apically. Pubescence of abdomen whitish, longer and more noticeable on fourth segment. Legs brown, knees and bases of all the tibiæ yellowish. Wings wholly hyaline; stigma very dilute, appearing as a small pale brown cloud, second vein regular.

37. VOLUCELLA ESURIENS Fabr. San José del Cabo, Baja California (Eisen). One male and one female. These are of the variety formerly known as *V. mexicana* Macq., but which should be called *violacea* Say, as the latter name has priority.

El Taste, Baja California (Eisen). September. One male and two females. Comondu, Baja California (Haines). March. One ♂. Magdalena Island, Baja California (Haines). March. One ♀.

38. VOLUCELLA FORNAX n. sp.

El Taste, Baja California (Eisen). September. One ♂. Considerably resembling *V. apicifera* Towns. Differs as follows from description of that species (see Trans. Am. Ent. Soc., 1895): Length, 12 mm. A well defined black facial stripe. Cheeks polished shining black. Frontal triangle with a blackish median line or vitta. Vertical triangle black. Antennæ blackish brown, second joint reddish yellow. Arista nearly bare. Pleuræ with white pile. Prescutellar parallelogram emarginate in middle anteriorly, the black nearly dividing it into two square spots. Posterior black margin of second abdominal segment a little widened laterally; that of third segment but slightly wider and of quite equal width throughout with a pointed projection on median line on anterior edge. Fourth segment blue-black only on posterior half, the anterior portion widely yellowish like other light portions of abdomen, only a narrow median line running forward from black but not reaching base of segment. Abdomen with white pile, except on black hind margins of second and third segments and a narrow space of the yellow in front of them, on which is black pile. Venter light yellowish black apically. Bases of all the tibiæ reddish yellow. Wings clear glassy hyaline, with rich brown clouds on small cross-vein, basal portion of third vein, second vein beyond the origin of third to opposite stigma, stigma and auxiliary and first veins opposite, and cross-veins at distal end of second basal cell.

A very elegant species.

39. Volucella haagii Jaenn. El Taste, Baja California (Eisen). September. Two males. One specimen seems to have the eyes contiguous for a somewhat greater extent than the other.

a broad median area and an isolated lateral spot black. Venter with four median black spots, the anterior one at base of second segment small, the second and third (on posterior borders of second and third segments respectively) successively larger, and that on anal segment very large.

El Taste, Baja California (Eisen). September. Two males in company with many *V. megacephala.* These agree well with the Arizona specimen. One, however, has the facial stripe obsolete.

41. VOLUCELLA LUCASANA n. sp.

El Taste, Baja California (Eisen). September. One ♀. Length, 8 mm. This species differs from *V. tolteca* as follows:

Length, 8 mm. A blackish vertical stripe down the eyes. Cheeks yellow with a broad black stripe anteriorly, broader above. Median facial stripe broadened above. Scutellum wholly blackish. Legs wholly blackish, the bases of front and middle tibiæ slightly tawny. Wings with a brown cloud on anterior outer half, following the distal veins of wing posteriorly to discal cell, and embracing a cloud on small cross-vein and a very much fainter one on cross-veins at distal end of second basal cell. Discal cell hyaline, first posterior mostly hyaline, submarginal narrowly hyaline on proximal portion.

42. VOLUCELLA MEGACEPHALA Lw., Willist. El Taste, Baja California (Eisen). September. Sixteen females and fourteen males. These seem to agree with the three specimens from Arizona and Mexico mentioned by Williston in his monograph (p. 146), except that there is a faint median pair of vittæ on thoracic dorsum between the broadly separated vittæ. There are fine black bristly hairs on lower edge of margin of scutellum. This spe-

cies is to be distinguished from *V. isabellina* Will. by the absence of brown lines on face and cheeks, by more extensive contiguity of eyes in male, by the much smaller vertical triangle, and by the black of hind margins of second and third abdominal segments being obsolete.

The specimens differ from Williston's description of *lata* (Biol. C.–A., Dipt., iii, 45–6) by having the hairs of front and face wholly black; the antennæ not what I should call "very small"; the dorsum of thorax with four faint blackish cinereous stripes, the lateral ones abbreviated before, the middle ones behind; and by the segments of the abdomen being of a more uniform smoky yellowish. They can hardly be that species.

43. VOLUCELLA SODOMIS n. sp.

El Taste, Baja California (Eisen). September. Two ♂. Differs from *V. estebana* as follows:

Length, 8 mm. Frontal triangle wholly shining polished black, extending below base of antennæ on each side in a tuberculous extension, strongly convex. Abdominal markings nearly the same, but the second segment more broadly blackish on median portion of disk.

45. **Eristalis latifrons** Lw. San Francisco county, Cal. One male in bad condition is doubtfully referred to this species.

46. **Eristalis obsoletus** Wied. El Taste, Baja California (Eisen). September. Thirty-one females. Length, 9 to 12 mm. The scutellum is quite yellow, with only a tinge of ferruginous. The spots of second abdominal segment are obscure reddish, rarely with a yellowish tinge.

47. **Eristalis tenax** L. California. Two males, two females, and the puparium from which one of the males emerged.

48. **Eristalis tricolor** Jaenn. El Taste, Baja California (Eisen). September. Two males and two females. Hind tibiæ narrowly yellow at base, front tibiæ yellow on nearly basal half, middle tibiæ and metatarsi almost wholly yellowish. They have the abdomen more extensively clear yellow than a specimen from Guanajuato.

49. **Xylota** sp. aff. **obscura** Lw. California. A single male specimen in bad preservation seems to come nearest to this species. It differs from description as follows:

Length, 11 mm. Antennæ brown, arista yellowish. Scutellum purplish, same color as greater part of abdomen. Abdomen blackish; second segment on each side anteriorly, third more broadly on each side and on hind border, and fourth almost entirely shining purplish. Base of tibiæ brown like rest of legs. Abdomen rather whitish pilose.

50. **Syritta pipiens** L. California. One female.

ŒSTRIDÆ.

51. **CUTEREBRA AMERICANA** Fabr. California. One female, 22 mm. long. I refer this specimen here although there is no visible yellowish or even whitish pile on pleuræ, which are covered with short thin blackish pile, with hardly a lighter tinge in some lights. Abdomen dull purplish.

32. **CUTEREBRA FONTINELLA** Clk.; Towns., Insect Life, v, 317–320. San Joaquin Valley, Cal. May 7. Two females, with the puparia from which they emerged. These both have the grayish bloom containing black spots extending well up on the dorsum of second and third abdominal segments (see description in Insect Life, l. c.) The anterior elongate whitish pollinose marking of front mentioned in my description is divided into two in both specimens, thus making three equal rather triangular markings arranged in form of a triangle. The two small round spots of cheeks are brown and shining, being simply the denuded surface, like a callosity without pollen. There is a velvet-black pollinose triangular spot on each side of facial depression at lower extremity of frontal

Baja California (Eisen). One female. The face is more silvery and not so yellowish as in northern (Michigan) specimens.

El Taste, Baja California. Two females and two males.

57. JURINIA LATERALIS Mcq. San José del Cabo (Eisen), and San Esteban (Haines, April), Baja California. One ♂ from each locality I am inclined to refer to this species.

58. MICROPALPUS sp.? El Taste, Baja California (Eisen). September. Two ♀. These greatly resemble *Echinomyia thomsoni* Will., but the eyes are hairy and third antennal joint is much longer than second. Length, 9–10 mm.

59. PHASIOPTERYX BILIMEKI B. & B. San Julio and San Esteban, Baja California (Haines). April. One ♀ from each locality I refer doubtfully to this species. But the neuration is not as in v. d. Wulp's figure (Biol C.-A., Dipt., ii, pl. 4, fig. 12), the second vein being much longer and nearly parallel with the costa, and the costa being bulged basally somewhat approaching the form of the male wing.

MUSCIDÆ.

60. COMPSOMYIA MACELLARIA Fab. San José del Cabo and El Taste, Baja California (Eisen). Numerous specimens, normal. San Julio, Baja California (Haines). April. One female of bluish tint.

Margarita Island, Baja California (Haines). March. One ♀, normal.

OSCINIDÆ.

61. OSCINIS COLLUSOR n. sp.

San José del Cabo, Baja California (Eisen). Seven specimens.

Length, 1⅓ to 2 mm. Head and thorax shining black, somewhat metallic. Front immediately next antennæ, and face, yellowish. Antennæ yellowish, blackish distally. Abdomen light yellowish on venter and base of dorsum, dorsum of third segment more or less brownish or blackish, of fourth or fifth shining blackish. Third segment sometimes dark only in middle and on sides. Second segment with a dark spot in middle. Legs yellow. Wings clear.

This species is a very annoying one to travelers, causing irritation of the eyes and the disease known as "mal de ojo." Its native name is "bovito."

PROCEEDINGS.

January 16, 1893.—STATED MEETING.

The PRESIDENT in the chair.

Marsden Manson was proposed for membership.

Donations to the Museum were reported from Charles Allison, W. G. Blunt, Chase Littlejohn and Charles Fuchs.

W. L. Watts read a paper on The Geological Economics of the Central Valley of California.

February 6, 1893.—STATED MEETING.

The PRESIDENT in the chair.

Donations to the Museum were reported from N. A. Freeman, G. C. Duncan, J. Anderson, John Hemsley, H. N. Cook, J. Z. Davis, Rev. F. H. Wales, C. P. Nettleton, J. H. Cluff, James E. Fowler and T. K. Couperus.

Additions to Library:

From correspondents	176
By purchase	39
By donation	10

W. L. Watts read a paper on Natural Gas in San Joaquin Valley.

W. S. Chapman, Gustav Eisen, T. H. Hittell and J. M. McDonald were appointed a committee to prepare resolutions requesting the Senators and Members of Congress from this State to use their utmost endeavors to preserve the present limits of the Yosemite Park Reservation.

Dr. Gustav Eisen read a paper on the Preservation of Game in the Sierra Nevada.

March 6, 1893.—STATED MEETING.

The PRESIDENT in the chair.

W. R. Dudley was proposed for membership.

Donations to the Museum were reported from W. H. Shockley, Mrs. E. L. G. Steele, W. L. Watts, Miss Anna Hewston, J. M. Hahn, C. E. Manning, D. T. Hughes, Capt. Praetz and Charles A. Keeler.

Additions to Library:

From correspondents	180
By purchase	49
By donation	5

A vote of thanks was passed to Mr. D. T. Hughes for his valuable donation of a collection of Lepidoptera from the Republic of Colombia.

George H. Ashley read a paper entitled An Illustration of the Flexure of Rock.

Dr. H. H. Behr read a paper on the Relations between Butterflies and Plants.

Walter E. Bryant read a paper entitled Descriptions of New Mammals from Lower California.

April 3, 1893.—Stated Meeting.

The President in the chair.

J. C. Branner, J. P. Smith, Marsden Manson and W. R. Dudley were elected resident members.

Oliver P. Jenkins was proposed for membership.

Donations to the Museum were reported from Mr. Stone, Wm. H. Shockley, Walter E. Bryant and E. F. Lorquin.

Additions to Library:

From correspondents	183
By purchase	51
By donation	11

W. L. Watts read a paper on Subterranean Air Currents in the Sacramento Valley.

Walter E. Bryant read a paper entitled Notes on the Food of Birds.

Dr. Gustav Eisen made some remarks on a dwarf Chinese lily, and spoke of the dwarfing of plants in general.

June 5, 1893.—STATED MEETING.

The PRESIDENT in the chair.

C. J. Sechrist was proposed for membership.

Donations to the museum were reported from W. W. Price. Mrs. R. M. Austin, W. L. Watts, Gustav Eisen, Mrs. George Buttner, Mrs. C. A. Boland, Charles Fuchs, Frank E. Harris and F. W. Gill.

Additions to Library:

From correspondents	172
By purchase	169
By donation	11

The President announced the death of Alphonse De Candolle, honorary member, and of members C. D. Gibbes and J. P. Hale.

Dr. Gustav Eisen read a paper on Late Investigations on the Pollination of the Fig.

Walter E. Bryant read a paper on Some Cases of Albinism in California Animals.

August 7, 1893.—STATED MEETING.

The PRESIDENT in the chair.

C. C. Riedy was proposed for membership.

Donations to the museum were reported from F. W. Gill, Mrs. J. G. Lemmon, Peter Gillis, A. W. Anthony, W. Gierisch, J. Z. Davis, Louis King, J. B. McLee, L. P. Peck, Hans Behr, W. M. Talbott, J. M. Tinoco, Charles Fuchs, R. C. McGregor, Mrs. N. S. Rose, S. W. Holladay and John Martin.

Additions to Library:

From correspondents	329
By purchase	213
By donation	12

Perham W. Nahl delivered a lecture on Improvements in Aerial Navigation.

Admiral Selwyn, R. N., was introduced by the President, and made some remarks on his trip to this coast, in 1837, in H. M. S. Sulphur.

August 14, 1893.—SPECIAL MEETING.

The PRESIDENT in the chair.

Admiral Selwyn, R. N., read a paper on a new adaptation of the humid process of extracting metals from their ores.

November 6, 1893.—STATED MEETING.

The **PRESIDENT** in the chair.

Donations to the museum were reported from Dr. O. V. Thayer, O. Johnson, Herman P. Rawson, J. G. F. Eitel, Mrs. T. H. Hittell, R. C. McGregor, James F. Nounnan, R. N. Simpson, L. G. Yates, B. M. Newcomb, Joseph Peccoroni, Dudley C. Stone, J. M. Barrickman, S. J. Holmes, Mr. Ankellie, Mrs. von Hoffman, Miss Anna Larensen, Mrs. Andrew Kohler, Frank H. Vaslit, H. R. Taylor, H. W. Dickinson. W. G. Blunt, Mr. Stewart, E. H. Fiske, Dr. J. C. Hawver, Dr. J. G. Cooper, J. L. Lockwood, Henry E. Carson, Cypriano Dodero, E. K. Stevenot, Alex. Bednawski, J. Z. Davis and Mrs. T. S. Brandegee.

Additions to Library:

From correspondents	321
By purchase	345
By donation.	8

The following papers were read by title:

Report on Mexican Hymenoptera principally from Lower California. By William J. Fox.

On a collection of Formicidæ from Lower California and Sonora, Mexico. By Theo. Pergande.

Tunicata of the Pacific Coast of North America. 1—Perophora annectens. By William E. Ritter.

Theodore H. Hittel read a paper on Oysters in San Francisco Bay.

December 4, 1893.—STATED MEETING.

December 18, 1893.—STATED MEETING.

The PRESIDENT in the chair.

Andrew C. Lawson was proposed for membership.

The Nominating Committee made their report, recommending the following ticket:

For *President*, H. W. Harkness.
First Vice-President, H. H. Behr.
Second Vice-President, J. G. Cooper.
Corresponding Secretary, George A. Moore.
Recording Secretary, J. R. Scupham.
Treasurer, L. H. Foote.
Librarian, Carlos Troyer.
Director of Museum, J. Z. Davis.
Trustees, W. C. Burnett, C. F. Crocker, D. E. Hayes, E. J. Molera, George C. Perkins, Adolph Sutro, John Taylor.

The following "Reform Ticket" was presented:

For *President*,
First Vice-President, H. H. Behr.
Second Vice-President, J. G. Cooper.
Recording Secretary, G. P. Rixford.
Corresponding Secretary, T. S. Brandegee.
Librarian, Charles A. Keeler.
Treasurer, L. H. Foote.
Director of Museum, Walter E. Bryant.
Trustees, W. C. Burnett, C. F. Crocker, D. E. Hayes, E. J. Molera, George C. Perkins, Adolph Sutro, John Taylor.

January 2, 1894.—ANNUAL MEETING.

The PRESIDENT in the Chair.

John Van Denburgh and John I. Sabin were proposed for membership.

Additions to the Library for the year 1893, were reported as follows:

From correspondents	1860
By purchase	977
By donation	100

The reports of officers and curators were read and ordered on file.

The President read his Annual Report as follows:

The President of the Academy has the honor to present the following report for the year ending December 31, 1893:

In conformity with a wise provision in our Constitution, the property of the Academy is vested in a Board of Trustees, who are elected annually.

To these seven gentlemen we have entrusted the collection and disbursement of our funds. All of them are actively engaged in business, and it often happens that, in attending the meetings of the board, their business has suffered; yet the society has no cause for complaint that its interests have suffered from neglect. With a true appreciation of the needs of the Academy, they have ever been ready to respond to the request, from the Council, for funds needful for the prosecution of our work.

The Council have ever been prompt to answer all calls upon them in the furtherance of the varied work of the society; and it is pleasant to observe how quietly and harmoniously the two bodies have worked together for the best results. The progress of the life of the institution has been unbroken; mainly owing to the fact that its officers have ever been in accord. Such harmonious action of the governing boards is all the more gratifying to those who look back, with a full recollection, to the discussions and misunderstandings of a few years since. With a due regard to the past and a hopeful outlook toward the future, all have worked together unselfishly and harmoniously for the best interests of all.

The Academy has grown by the most natural development, and what the present is beginning to realize is but the fulfillment of the dreams and hopes of the more distant past. It is to the President of the society a matter not only of satisfaction, but of grateful acknowledgment, that the kindly fellowship existing between the two boards of guardians, becomes more and more apparent as time progresses.

In his inaugural address, which the President presented to the society after his entrance upon his official duties, in 1887, he used the following words with reference to the peculiar circumstances of the moment:

"The life and usefulness of a scientific society depends upon the activity of its members, and its publications."

but upon Sundays and holidays as well. That the opening of the Museum upon holidays has been a success is proven by the fact that a large number of visitors have taken advantage of such opportunity. It was not deemed advisable—owing to the extra cost—to keep a record of the number of visitors, yet, a careful estimate places the number as exceeding one hundred thousand for the year.

In many instances the labels in the Museum—from age or other cause—had become defaced or obscure. Much labor has been expended in replacing these, and, so far as possible, to assist the observer in the identification of the objects upon exhibition. By this means the necessity for the use of a printed catalogue is in a measure obviated.

The thanks of the society are due to the Director of the Museum, in recognition of his services. Aside from the fact that he has given gratuitous service in the interest of his department, he has also, with his accustomed liberality, presented to us many rare and valuable additions to our collection. These gifts acquire increased importance when we take into consideration the fact that he is a prominent official in a kindred institution, in favor of which large demands have been made both upon his time and purse. The friends of the Academy, who are most deeply interested in its prosperity, will appreciate his services, and his gifts as well. That other benefactors will arise is not only to be hoped, but also expected.

Amongst the many valuable donations made to the Museum during the year, I may mention a few of the more prominent ones, viz., from Mr. B. E. De Lopez, an excellent specimen of the Dugong; from Captain Knowles, the skin of a male walrus; from J. Z. Davis, a valuable collection of birds, mammals and reptiles, thirty-eight fossils, and a large Japanese vase; from N. S. Rose, a collection of eggs; from Mrs. Andrew Kohler, a large number of rare coins; from Mr. R. C. McGregor, skins of mammals; from T. H. Hittell, shells; together with very many other articles of value —gifts from different individuals.

Among the specimens obtained by purchase, is that of a meteorite, which fell in the vicinity of Oroville. The mass is of fifty-three pounds' weight, and is one of the most perfect of its kind.

We shall soon be in pressing need of more cases for the display and protection of our rapidly increasing collection, for the placing of which there is still abundant room in our galleries.

We have also contracted for the skeleton of an Arctic whale, of the length of eighty feet, or more; the cost of which Mr. Davis generously offers to meet.

The report of the Librarian, through his assistant Mr. Vaslit, is submitted herewith. The increase in number of volumes during the year, through gifts or purchases, is most gratifying.

The Trustees have met the demands of the Librarian for the funds requisite for the purchase of books with a spirit of liberality. Twice the amount of their allowance might have been advantageously used. The Library is becoming more and more important to the Academy, as it is rapidly advancing, and as the methods of study are changing and improving. Every provision possible should be made for its growth; as such accumulations are of the greatest importance to all who may be engaged in any department of scientific work.

The society has reason to acknowledge, with thanks, the care and efficiency of the Assistant Librarian in his efforts for its development, and his wisdom and skill in the purchase and securing of books, greatly exceeding in value the accessions of any previous year.

Due credit should be given to Captain Vodges, not only for valuable donations to the Library, but also for his assistance in the general management of the same.

The total of our accessions to the Library, as shown by the report of the Librarian, amounts to 2,937 volumes, viz.: from correspondents, 1,860; by purchase, 977; by donation, 100.

There is a pressing need for more shelving for the Library, and immediate application will be made to the Trustees for the money needed for that purpose.

Our publications for the past year will take rank, both in volume and in value, with those of the previous years. An effort has been made to distribute them to all of the members; in this effort, the publication committee trust they have succeeded.

Necessarily, the volume of our Proceedings for the year 1893 is not yet completed. A portion, however, is already in print, while other portions are in the hands of the printer.

An extensive list of papers is in preparation, by different experts, upon various subjects, among which are the following:

Theo. Pergande, On a collection of Formicidæ from Lower California and Sonora, Mexico.

Wm. E. Ritter, Tunicata of the Pacific Coast of North America.

Mrs. K. Brandegee, Revision of Ceanothus.

Gustav Eisen, On California Eudrilidæ.

The papers which have been read at our meetings will compare favorably with those of previous years; but it must be borne in mind that all, or nearly all, of the papers which are prepared for publication are of far too technical a character to be read at our stated meetings, so that, with scarce an exception, they have been read only by title.

The Recording Secretary has been prompt in the discharge of his onerous duties, having been regular in attendance at the meetings of the Academy and always ready with advice in the Council.

The Treasurer has fulfilled his trust in a manner which is deserving of the commendation of the society, and it is to their credit that he has been continued in office.

Dr. Eisen spent two and one-half months of the past year in Lower California and Mexico, in making collectiens in natural history. In this undertaking he was eminently successful, having secured a great number of species in that region, a locality which has proved of so much value to us.

For the remainder of the year, the Doctor has continued his biological work, and an important paper from his hand is now in the hands of the printer.

A new microtome, with all needful accessories, has recently been purchased, which is an important addition to the equipment of his department.

The botanical department has been under the care and supervision of Mrs. Brandegee and Miss Eastwood.

In mid-summer Mrs. Brandegee, accompanied by her husband, paid a visit to Lower California in the interest of botany. As their visit was so timed as to bring them in the field at a different season from that of any previous one, as was to be expected, many new forms were discovered.

Miss Eastwood has made excursions to various and remote parts of the State, for a like purpose.

These forays, as we had anticipated, have resulted in important additions to the herbarium. It must be borne in mind, however, that active collectors have traversed our State in every direction, and that the discovery of a new species is of somewhat rare occurrence.

Aside from the field-work of our collectors, a large number of plants have been obtained by purchase, or exchange with collectors in the Eastern States.

Mrs. Brandegee, in addition to the needful care and identification of her Lower California collection, has been actively at work in revising the Genus Ceanothus, a paper upon which subject will soon be in press.

Miss Eastwood, when not in the field, has devoted herself to the detail work of the herbarium. Meanwhile, as circumstances will admit, she economizes her time in the preparation of a paper upon the Genus Allium.

Work in mounting the specimens in the herbarium has continued, without interruption, during the entire year.

Mr. Bryant, in charge of the department of birds and mammals, while not adding new species, for reasons which are obvious, has cared for those in the collection in a painstaking manner.

Mr. Fuchs, in the department of Coleoptera, has cared for those collected in Lower California, mounting them in so delicate a manner that few can equal.

Dr. Cooper, in fossils, has made a careful revision of the living and fossil shells of the year; and will relabel our whole collection, if possible, during the coming year.

Dr. Behr has cared for the Academy's collection in entomology, but few opportunities have offered for him to increase the same.

Prof. Gilbert, having been constantly occupied in the interest of the Stanford University, has had but little time to devote to the department of ichthyology. It is to be hoped that, in the future, he may be able to devote more time to our collection.

From this hasty sketch of the work accomplished during the past year, and with the present bright outlook for the future, with a young and ambitious staff of workers, we may well indulge the hope that the coming year will be one of the greatest importance to the well-being of our society.

On motion it was ordered that the report of the President be entered in full on the minutes.

The judges and inspectors of election reported the following officers

January 15, 1894.—Stated Meeting.

The President in the chair.

James Spiers and L. F. Reichling were proposed for membership.

C. C. Riedy, C. J. Sechrist and Oliver P. Jenkins were elected resident members.

Dr. Gustav Eisen read a lecture on "Lower California, its Climate. Scenery and Resources," illustrated with stereopticon views.

February, 5, 1894.—Stated Meeting.

The President in the chair.

Joseph W. Hobson was proposed for membership.

The donation was reported of 350 plants from Denmark, a gift to the herbarium from Mr. Ditlyf Thaanum.

Additions to the Library:

From correspondents	130
By purchase	26
By donation	12

Dr. H. H. Behr read a paper on Dr. Müller's Antidote to Snake Bite.

Miss Alice Eastwood read a paper on Alpine Flora of Mount Shasta.

W. L. Watts read a paper on Sulphur Deposits of the Sunset Oil District, Kern Co., Cal.

February 19, 1894.—Stated Meeting.

The President in the chair.

Frank W. Bancroft and J. H. Sanger were proposed for membership.

Dr. B. W. Evermann, of the U. S. Fish Commission, delivered a lecture on the Fur Seal Investigations of the U. S. Fish Commission Steamer Albatross in 1892, illustrating his remarks will stereopticon views.

A vote of thanks was tendered Dr. Evermann.

March 5, 1894.—Stated Meeting.

The President in the chair.

Donations to the museum were reported from W. L. Watts, A. F. Spear, B. E. de B. Lopez, Charles Bellman, J. D. Clark, H. W. Turner, W. F. Nolte, Mrs. E. C. B. Fassett, Mrs. Boland and J. H. Corbin.

Additions to the Library:

From correspondents	146
By purchase	23
By donation	2

A special vote of thanks was voted to Dr. Gustaf Retzius for the donation to the library of his valuable work, in two volumes, "Das Gehörorgan der Wirbelthiere."

The Committee on National Park Reservation made the following report, which was adopted and the Secretary instructed to send copies to the Representatives and Senators from the Pacific Coast and to the leading newspapers:

WHEREAS, It has come to our knowledge that the only remaining herd of buffaloes in the Yellowstone Park has been wantonly destroyed by hunters and sportsmen.

It has also come to our knowledge that the only colony of beavers in the same park has been destroyed by maliciously inclined hunters.

The destruction of these and many other of our large and interesting animals is not only a loss to science and education, but it will be felt as a matter of deep regret that the game which it is so desirable to preserve in our public and Government parks has not been protected, so that from those stocks distributions may be made in future time.

It is also our opinion that this wholesale destruction of game is due to insufficient guard, to incapable management and to lack of genuine interest in the preservation of the game by those employed by the Government for that purpose.

Therefore, be it Resolved, That the California Academy of Sciences hereby most earnestly and respectfully recommends that the Government considers the propriety of placing all National parks under the immediate care, control and management of the Military Department of the Government, subject to such rules and regulations as may from time to time be deemed advisable and issued by the Secretary of War, to the end and purpose that the game now yet remaining upon such reservations may be

March 19, 1894.—STATED MEETING.

The PRESIDENT in the chair.

L. F. Reichling, Frank W. Bancroft, Andrew C. Lawson, John I. Sabin, Joseph W. Hobson and James Spiers were elected resident members.

Dr. David Starr Jordan delivered a lecture on the Geographical Distribution of Fishes.

April 2, 1894.—STATED MEETING.

The PRESIDENT in the chair.

Frederick W. Woodworth was proposed for membership.

Donations to the Museum were reported from Capt. J. N. Knowles, Henry Jacobson, U. S. National Museum, Harry W. Deas, Nathan Sanford, John T. Kelley and M. Braverman.

Additions to the Library:

From correspondents	268
By purchase	36
By donation	5
By exchange	3

Prof. William E. Ritter read a paper on the Third Eye of Vertebrates and Some New Light on its Significance.

April 16, 1894.—STATED MEETING.

The PRESIDENT in the chair.

The following papers were read by title:

Second Report on Lower California Hymenoptera. By Wm. J. Fox.

Some Parasitic Hymenoptera from Lower California. By Wm. H. Ashmead.

Land and Fresh Water Mollusca of Lower California. By J. G. Cooper.

On Some Pliocene Fresh Water Fossils of California. By J. G. Cooper.

Herman Schussler delivered a lecture on Our Water Supply.

May 7, 1894.—STATED MEETING.

The PRESIDENT in the chair.

S. J. Holmes was proposed for membership.

Donations to the museum were reported from J. B. McLee, W. N. Jehu, Arnold Meyer, Officer P. Whelan, James L. Lockwood, D. C. Stone, R. E. Wood, Helena Lapidary Co., J. Z. Davis, Smith & Young and E. L. G. Steele.

The following papers were read by title:

Description of a New Ribbon Fish from San Francisco. By David Starr Jordan and Charles H. Gilbert.

Description of a Little Known Agonoid Fish. By Frank Cramer.

Description of a New Wood-Rat from the Coast Range of Central California. By W. W. Price.

Formicidæ of Lower California. By Theo. Pergande.

Dr. O. P. Jenkins read a paper on the Origin of the Senses.

May 17, 1894.—Stated Meeting.

The President in the chair.

Prof. E. E. Barnard delivered a lecture, on Comets and Meteors, illustrated with stereopticon views.

June 4, 1894.—Stated Meeting.

The President in the chair.

Donations to the museum were reported from George W. Lahnsen, A. Spiering, B. G. Reeder, Wm. Miller, S. W. Holladay, Warren Sosa and W. M. Wood.

Donations of plants were reported from Canadian Geological Survey, Gray Herbarium, Agricultural College of New Mexico, Missouri Botanical Garden, Royal Herbarium of Munich, Germany, and C. V. Piper.

Additions to Library:

WHEREAS, It has come to the knowledge of the California Academy of Sciences that efforts are being made in Congress to reduce the government reservations, particularly that so recently established in the Sierra Nevada Mountains, near to and south of the Yosemite and San Bernardino.

THEREFORE, The Academy respectfully and most earnestly protests against such reductions or encroachments, it being a trespass or spoliation of an inheritance which should by every legitimate means be preserved by this generation for those who are to come after us.

We respectfully ask that no encroachments be allowed, for the good reason that we have a most ample supply of timber and of grazing lands for all present demands without such encroachments; and if we owe any duty to the coming generations, it surely is that we protect for and leave to them a reasonable portion of those vast timber regions with which nature has so abundantly enriched us. We ask this protection for the reservations so wisely granted by a thoughtful and generous government, inasmuch as that we have sufficient forests for all our demands, independent of the present reserves.

Our population is now sparse and small, but with our vast plains of fertile and unoccupied lands and our unequaled climate, we must in all reason expect our population in the not distant future to double, and even treble, many times over; and when that condition shall be found to exist, then will be seen and appreciated the foresight and wisdom of our government in reaching out its protecting arm to save for those conditions at least a small portion of our great supply of timber. Under proper control and management our reservations may be utilized for grazing purpose, without detriment and possibly to some advantage, but under no circumstances should any encroachment upon the timber be permitted.

The time will come when no man will be allowed to fell a tree without planting another to take its place, as is now the case in many countries. It has been conclusively proven that the terrible droughts, floods and famines in southern Russia are directly caused by the great destruction of timber, permitted by the unthinking generations of the past.

It is also a well-established fact that the droughts and failures of crops in a large area of France are due to the change in climate, caused by the destruction of forests since the revolution in the last century. It is furthur known that the French Republic has, within the last twenty years, expended thirty millions of dollars in endeavoring to renew their forests in the most needed parts of the country, and that it has been estimated that eight hundred millions of dollars are yet required to reforest the country sufficiently to protect it from devastation by droughts, floods and damaging frosts caused by destroying the timber from the water-sheds during the past ninety years.

THEREFORE, We earnestly recommend that no reduction of our now limited reservations be permitted, and that many other reserves be judiciously selected at an early day, that the next century may not justly reflect upon us, as the present does the past in countries where the forests have been destroyed.

Therefore, be it Resolved, That these resolutions be printed and copies speedily forwarded to our Senators and Representatives in Congress and to the heads of the Land Department.

William S. Chapman,
Gustav Eisen,
Committee.

Robert Stevenson read a paper on the Theory of Gravitation.

August 6, 1894.—Stated Meeting.

The President in the chair.

Dr. John Hornung was proposed for membership.

Donations to the museum were reported from A. F. Haas, Willie Lee, J. Z. Davis, I. Benyaker, C. H. Northrup, N. H. Chittenden, J. J. Kinrade, W. W. Haskell, Searles Bros., Nevada Building of Midwinter Fair, Mr. Boyce, H. C. Behr, Miss Lucy Swett, Penn Chemical Works, and German Kali Works, Stassfurt.

Additions to Library:

From correspondets	238
By purchase	65
By donation	15
By exchange	5

The following papers were read by title:

The Coleoptera of Baja California. By George H. Horn.

John Van Denburgh read a paper on Reptilia of the Cape Region.

W. L. Watts spoke on the Gas and Oil-bearing Formations of the Central Valley of California and the Neighboring Foothills.

October 1, 1894.—Stated Meeting.

The President in the chair.

Harold Fairbanks was proposed for membership.

Donations to the museum were reported from Charles A. Keeler, McCollum Fishing and Trading Co., H. Bouton, W. P. Stevens, Adolph Dehnst and Mrs. John Reid.

The President announced the death of Dr. David Wooster, resident member.

Leverett M. Loomis read papers on The Migration of Birds and The Song Season of Three Carolina Birds.

October 15, 1894.—Stated Meeting.

The President in the chair.

Theodore H. Hittell read a paper on the Shell Mounds of Alameda County.

S. A. Shehadi read a paper on the Bedouin Arabs of Western Asia.

The thanks of the Academy were voted to Mr. Shehadi.

November 5, 1894.—Stated Meeting.

The President in the chair.

Donations to the museum were reported from T. H. Hittell, S. H. Kent, Mr. Blanford and Mrs. Hittell.

Donations of plants were reported from California Botanical Club and Young Naturalists Society of Seattle, Washington.

Additions to Library:

From correspondents	166
By purchase	24
By donation	10

Dr. C. H. Gilbert addressed the Academy on Recent Explorations by the U. S. Fish Commission in the Northwest.

December 3, 1894.—STATED MEETING.

The PRESIDENT in the chair.

Donations to the museum were reported from Fred Glidden, T. Enomato, John I. Carlson and Capt. J. N. Knowles.

Additions to Library:

From correspondents	112
By purchase	25
By donation	6

Irving M. Scott addressed the Academy on "Ourselves; or the Condition of California as compared with Older States."

The following paper was read by title:

Catalogue of Marine Shells collected chiefly on the Eastern Shore of Lower California for the California Academy of Sciences during 1891-2. By J. G. Cooper.

December 17, 1894.—STATED MEETING.

The PRESIDENT in the chair.

The Committee on Forest Reservations made the following report, which was unanimously adopted:

WHEREAS, Several bills and amendments to the bill to protect forest reservations are now before Congress; and

WHEREAS, These bills and amendments propose to eliminate from the reservations all lands which their supporters claim to be more valuable for agriculture than for forest purposes:

Therefore, be it Resolved, That this, the California Academy of Sciences, will be diminished, and the vast plains below will become proportionately barren and of little value. There are millions of acres of agricultural lands on the plains and in the foothills of this State not included in the forest reservations or public parks, which lands are not yet cultivated, and it will take many generations, even with a greatly increased population, before these lands are settled upon and cultivated. These plains and rolling lands, outside of the public parks and reservations, are much more valuable for agriculture than any lands in said reserves, and moreover many of them could not be properly irrigated except with the waters which the forest reservations are intended to preserve. Until such time, therefore, in the far-away future, when possibly our agricultural lands become overcrowded, no infringement upon the forest reservations should be permitted, and any effort to diminish them will result injuriously to this State and the nation at large, for the reasons above stated. What few and small patches of cultivable lands and meadows may exist in the forest reservations and public parks are absolutely necessary for the purpose of furnishing food and pasture for the teams and horses of the traveling public visiting those wonderful forests and marvelous waterfalls. If such locations are allowed to be gobbled up, the reservations themselves could not be enjoyed by the people at large; and

WHEREAS, Congressman Bowers of California is quoted as having stated, among other things, that:

"Of all the assets that the present Administration fell heir to when it succeeded to the Government, it seems to consider this looting of the public domain as the most sacred trust. In accordance with the recommendation of the forest reserve incubator, on February 14, 1893, thirty townships of land in Kern county were made a forest reservation. In those townships there were at that time 300 legal voters, 5,000 tons of hay were raised there last year, and 7,000 acres are under irrigation. There are six public school buildings, four churches, 10,000 cattle and over 1,000 horses owned by the settlers. These were grazing on those sections. The assessed valuation of the improvements made by the settlers is over $400,000. Many of these settlers have been there for ten to twenty years, and large areas of lands in this reservation are fine natural farming lands. The making of this reservation was an inexcusable outrage, and these townships should be restored to the public domain. The history of this forest reservation is the history of other reservations in California."

Therefore Resolved, This, the Academy of Sciences, does declare that these statements by Mr. Bowers are greatly exaggerated; they must have been based upon erroneous information. Surely there are no churches, no school houses and no settlements upon such reservations, save alone by such people as are manufacturing lumber or desiring to do so.

Such complaints come, undoubtedly, from such class of people as raided the timber lands of Maine, Michigan, Wisconsin and Minnesota, and finally fixed their gaze upon the splendid sugar pines of our mountains, as well as the immense Sequoia and the incomparable redwoods of this Coast.

Resolved further, That the Academy of Sciences print and supply all our Members of Congress and all those who have taken an interest in this movement—especially the Hon. Owen A. Wells of Wisconsin—with copies of these resolutions.

W. S. CHAPMAN,
GUSTAV EISEN,
Committee.

Dr. Gustav Eisen made a preliminary report on the expedition sent by the Academy to Lower California and Mexico.

The Nominating Committee made their report, recommending the following ticket:

For *President*, H. W. Harkness.
First Vice-President, Charles H. Gilbert.
Second Vice-President, J. G. Cooper.
Corresponding Secretary, George A. Moore.
Recording Secretary, George C. Edwards.
Treasurer, L. H. Foote.
Librarian, Carlos Troyer.
Director of Museum, J. Z. Davis.
Trustees, W. C. Burnett, Charles F. Crocker, D. E. Hayes, E. J. Molera, George C. Perkins, Wm. S. Chapman, John Taylor.

January 7, 1895.—ANNUAL MEETING.

The PRESIDENT in the chair.

Donations to the Museum were reported from Dr. John Rabe, F. Mc-

The reports of officers and curators were read and placed on file.

A vote of thanks was passed to the executive officers of the Academy for the able and efficient manner in which they had conducted the affairs of the Academy during the past year.

It was revolved that the Board of Supervisors of the City and County of San Francisco be requested to place a fence around the statuary erected through the munificence of James Lick in the City Hall Park.

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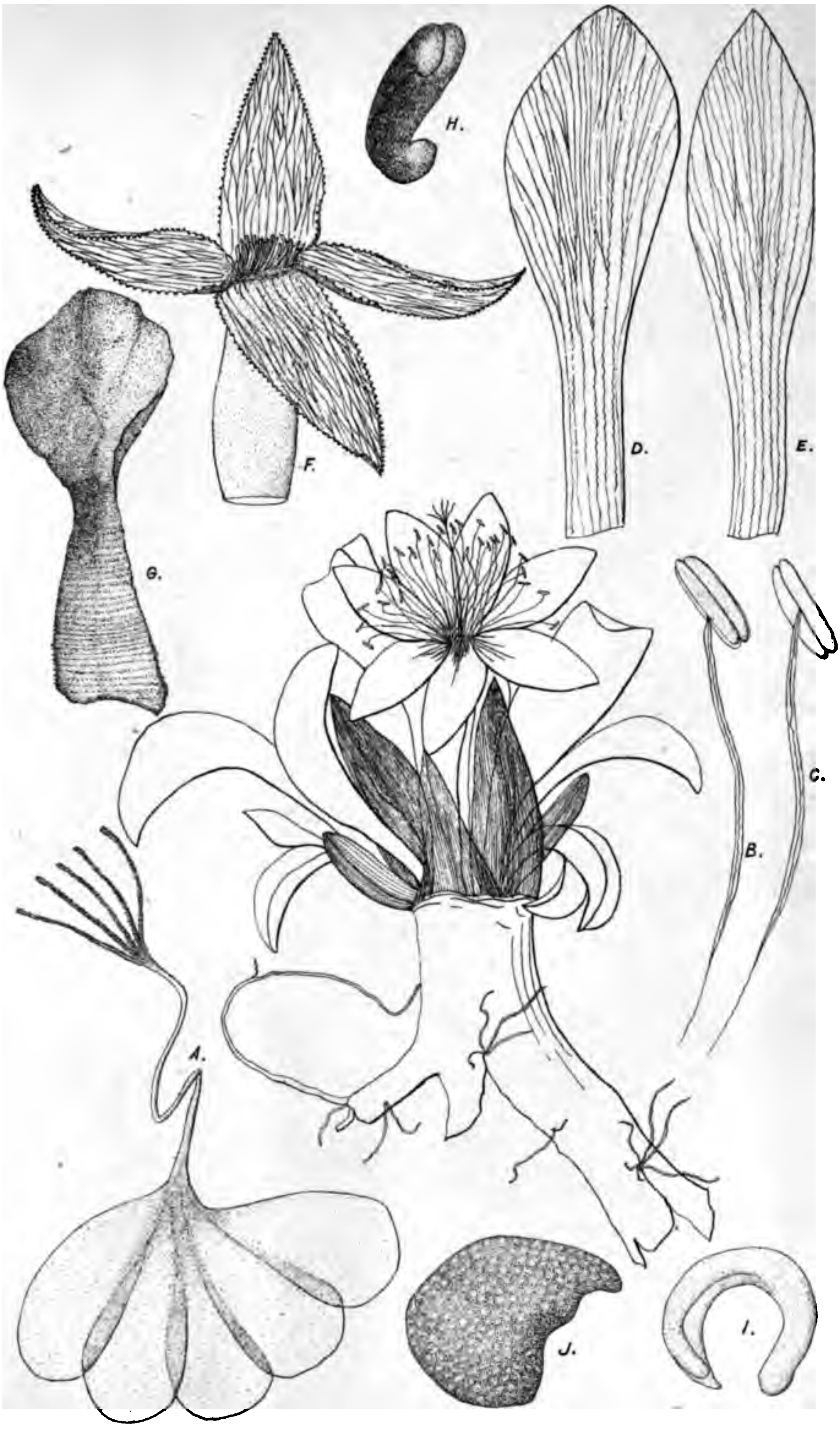

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LEWISIA KELLOGGII.

PLATE I

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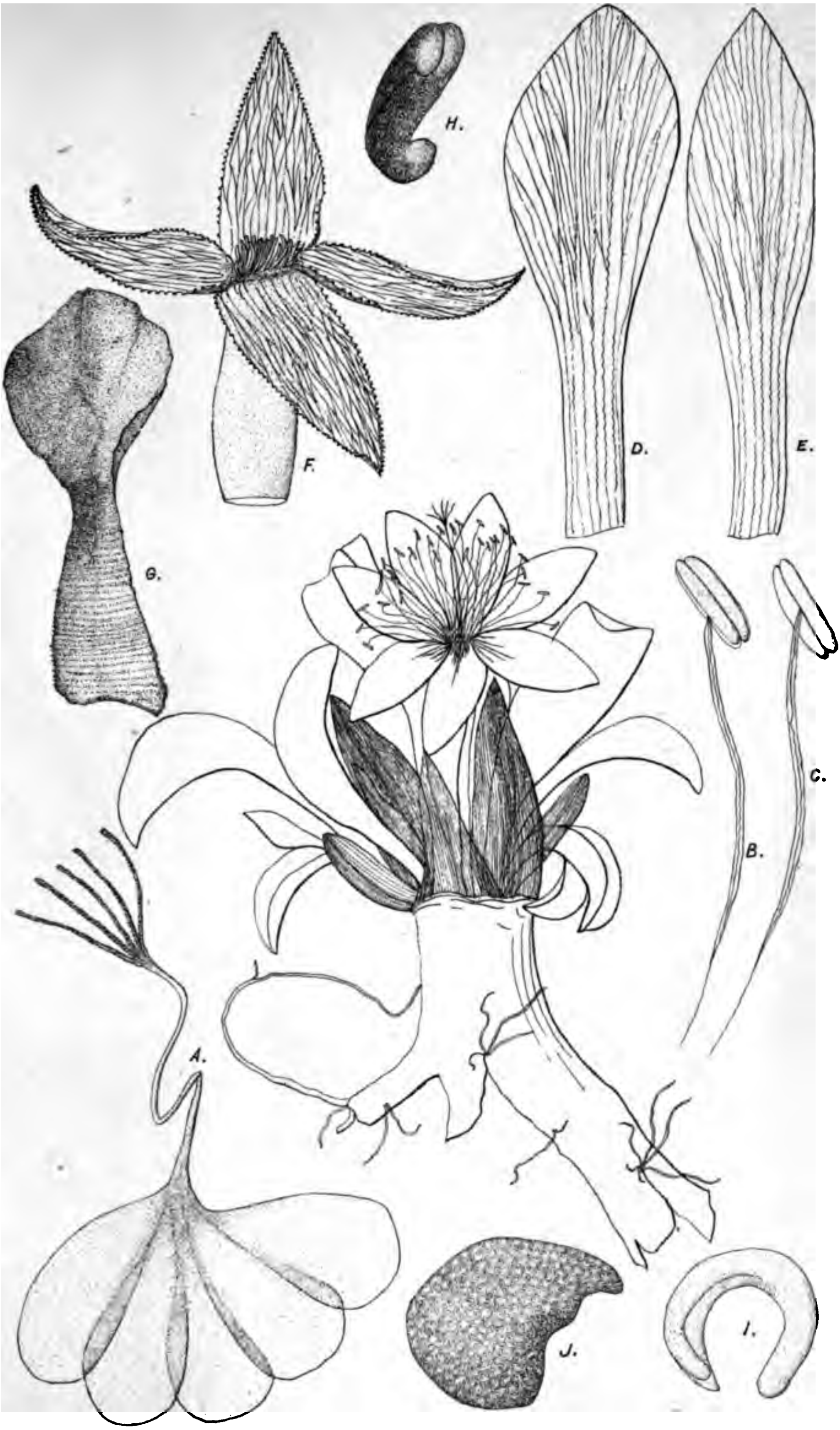

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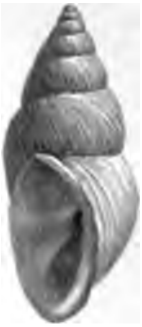
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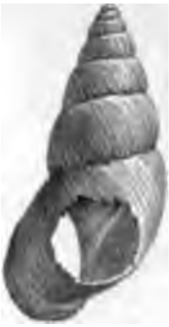
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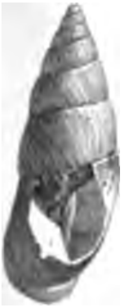
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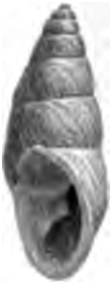
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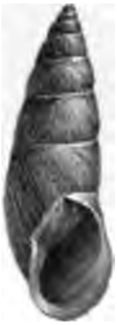
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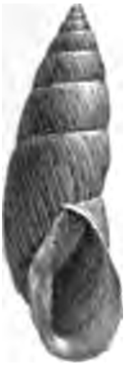
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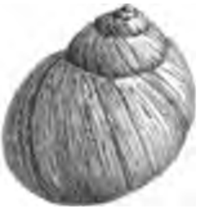
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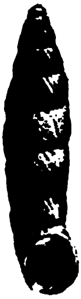
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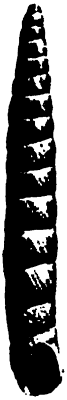
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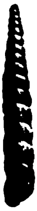
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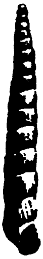
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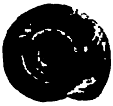
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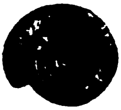
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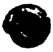
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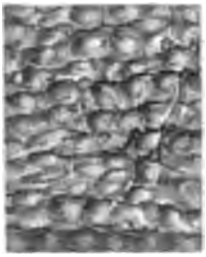
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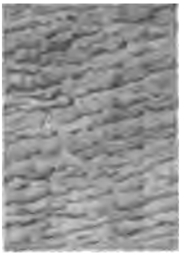
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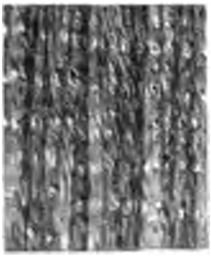
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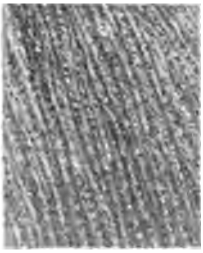
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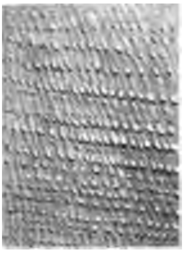
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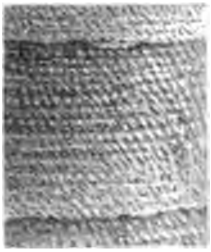
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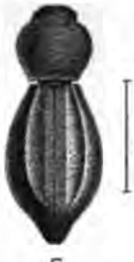
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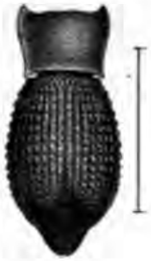
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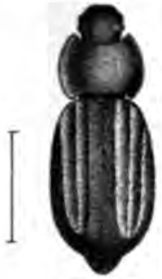
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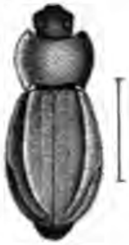
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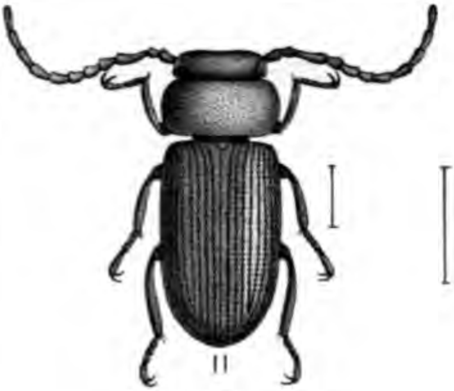
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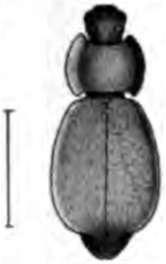
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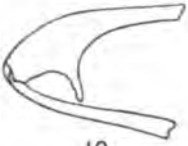
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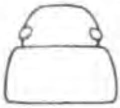
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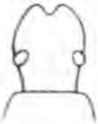
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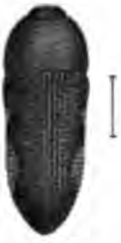
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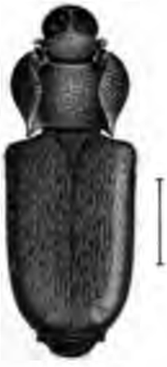
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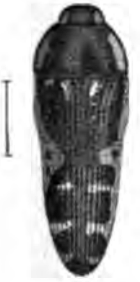
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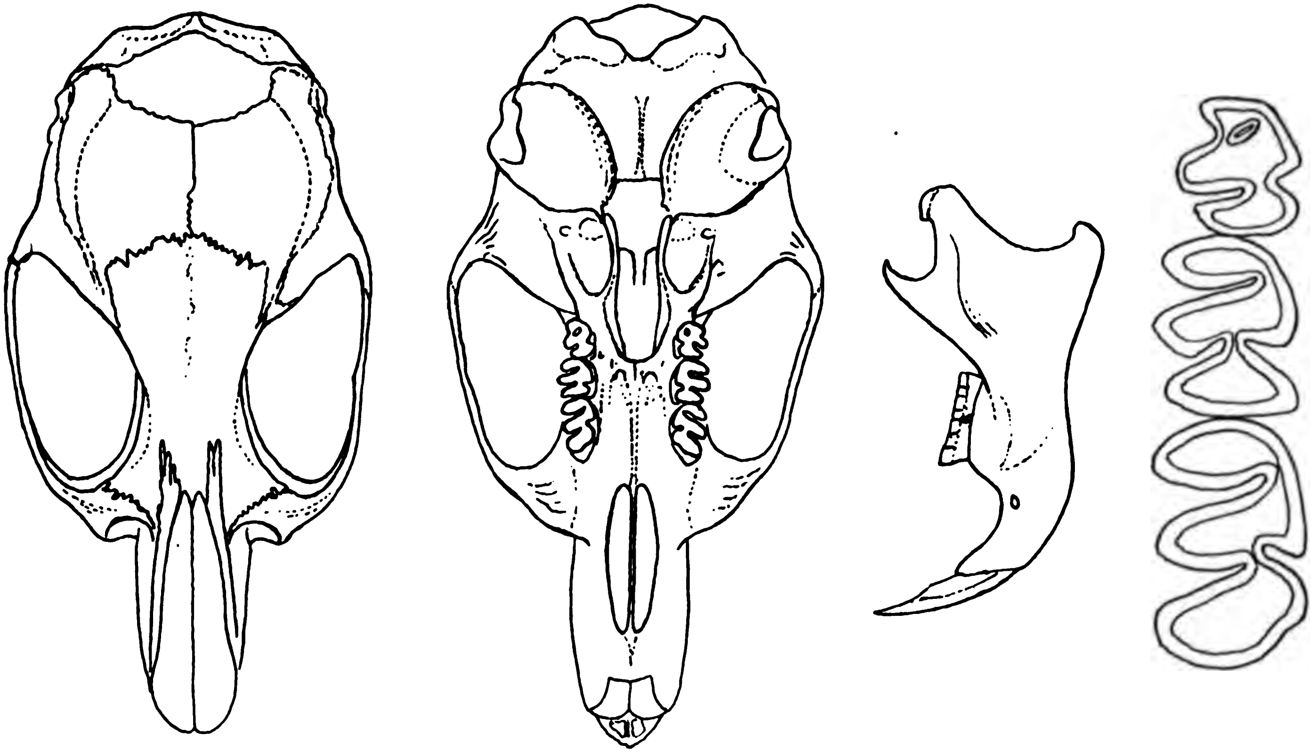
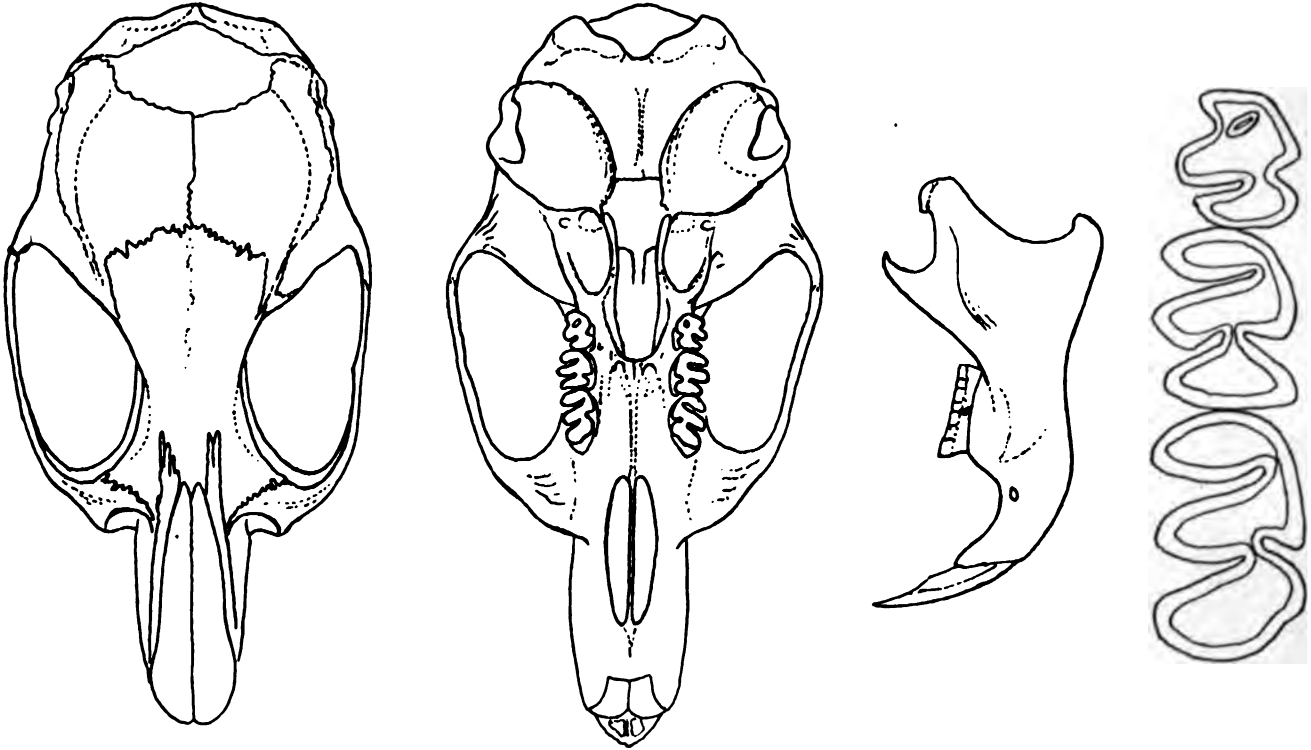
Edwin Sheppard del. et lith. Century Lith. Co Phila

PLATE XII.



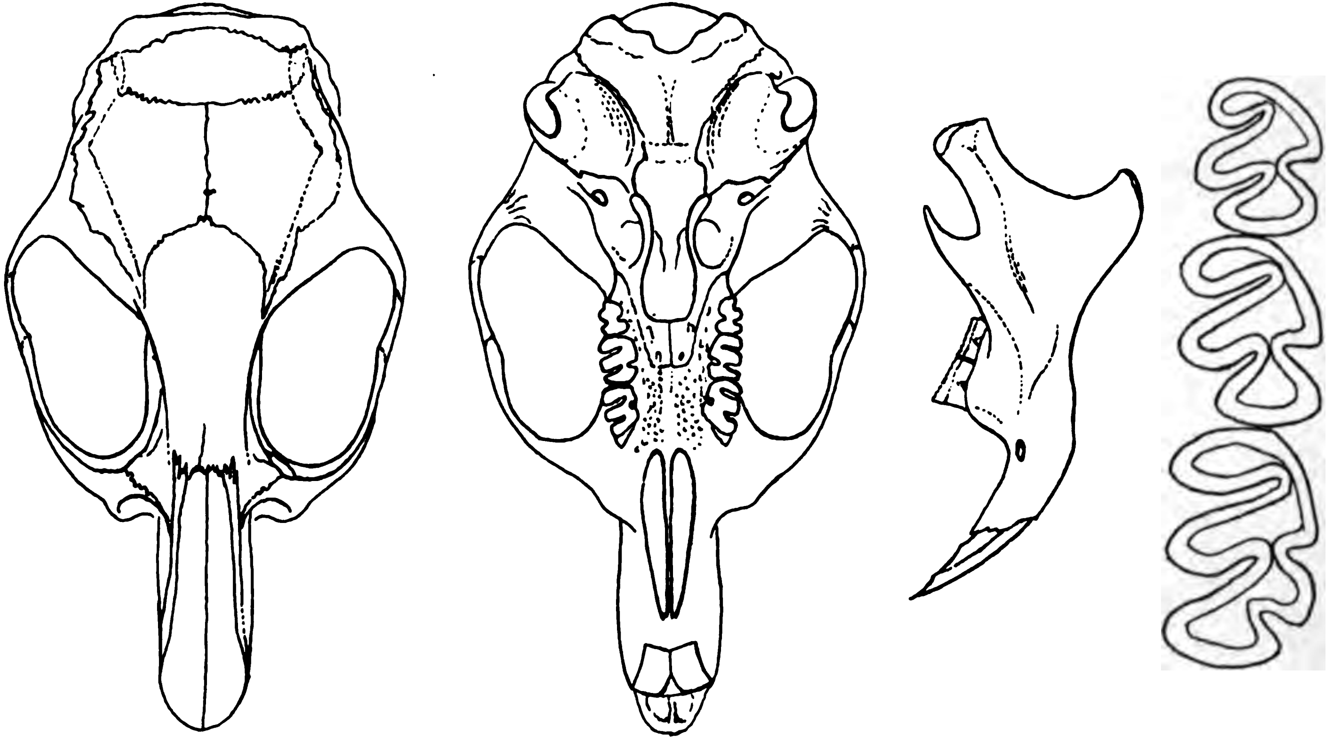
NEOTOMA ALBIGULA.

PLATE XII.



NEOTOMA ALBIGULA.

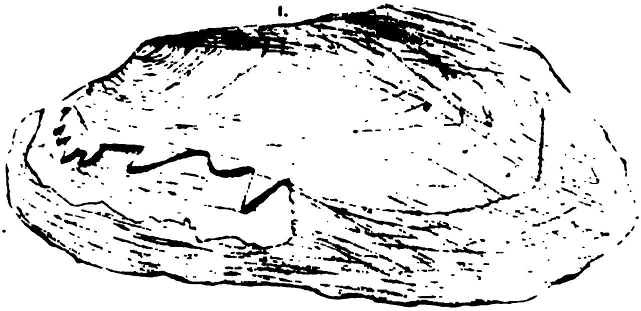
PLATE XIII.



NEOTOMA MEXICANA.

PLATE XIV.

1.



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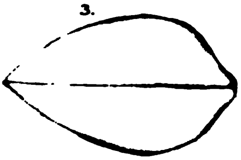

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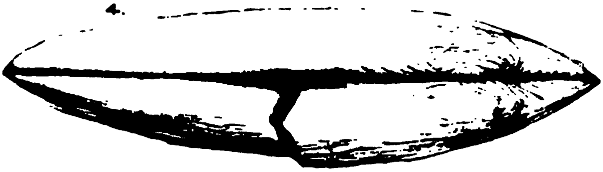

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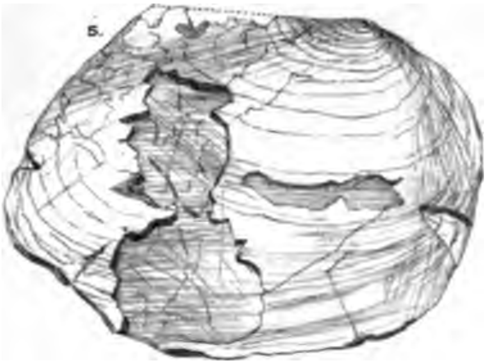

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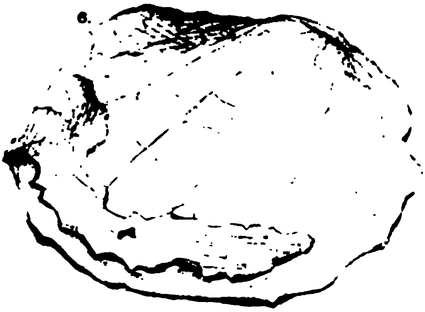

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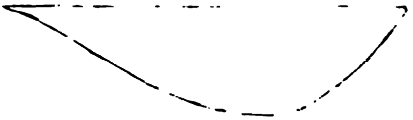

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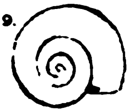

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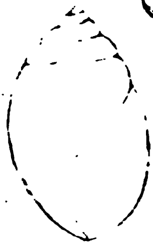
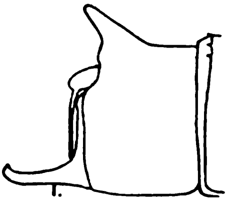


LITH. BRITTON & REY, S.F.

PLATE XV.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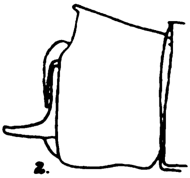
Ischnura? erratica .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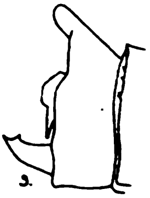
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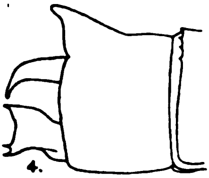
Isch. cervula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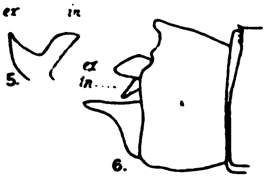

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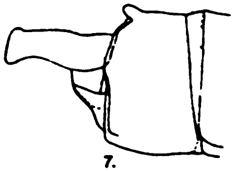
Isch. Ramburii var. credula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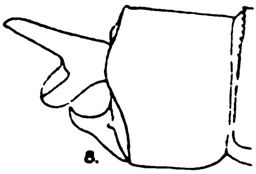
Enallagma Eiseni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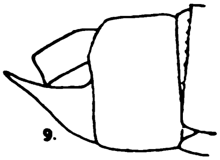
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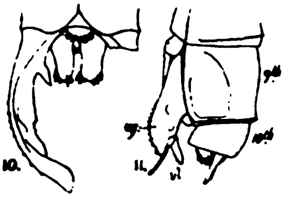
Erythragrion salvum



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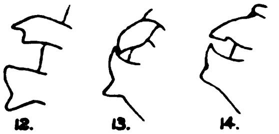
Archilestes grandis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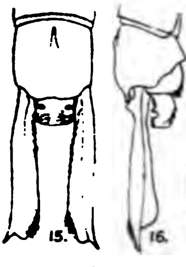
Argia
cuprea *livida* *agrioides*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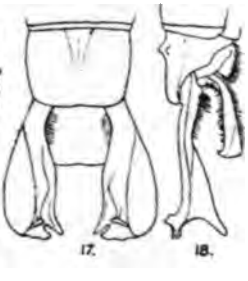
Anax junius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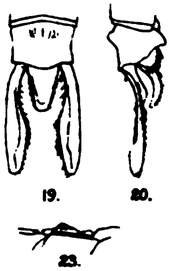
Anax Walsinghami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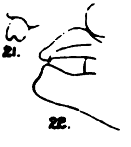
Aeschna californica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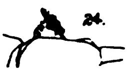
Argia oenea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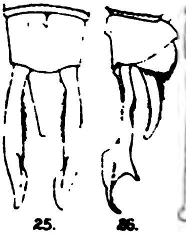
Ae. cornigera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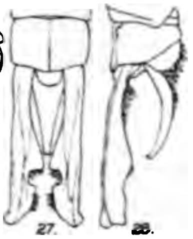
Ae multicolor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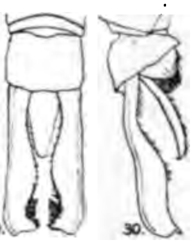
Ae. luteipennis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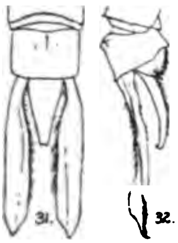
Ae. constricta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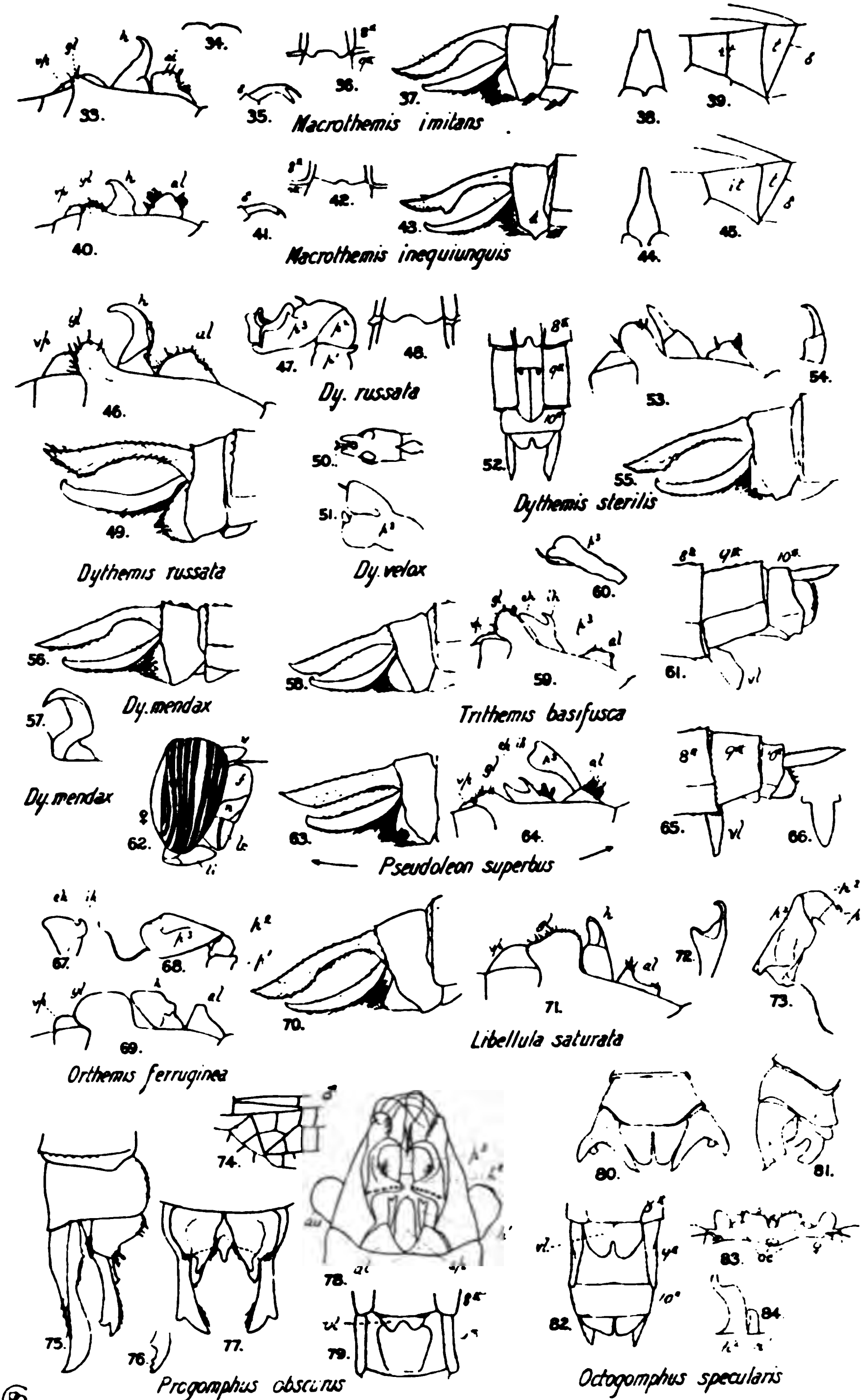
Ae. cornigera



Macrothemis imitans

Macrothemis inequiunguis

Dy. russata

Dythemis sterilis

Dythemis russata

Dy. velox

Dy. mendax

Trithemis basifusca

Dy. mendax

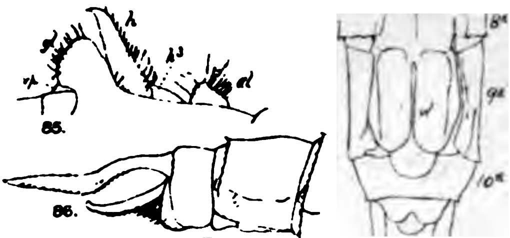
Pseudoleon superbus

Libellula saturata

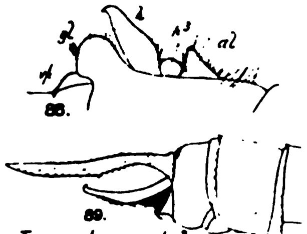
Orthemis ferruginea

Progomphus obscurus

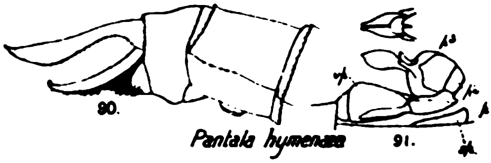
Octogomphus specularis



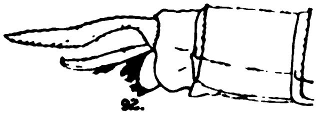
Tramea onusta

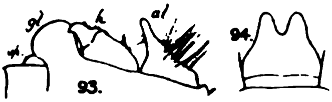


Tramea longicauda ♀ var.



Pantala hymenaea





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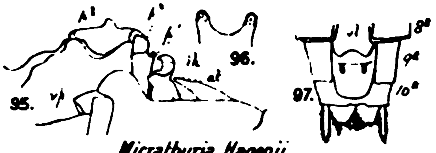
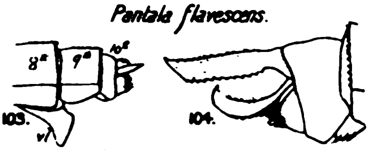
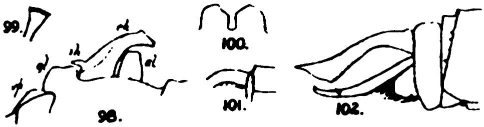
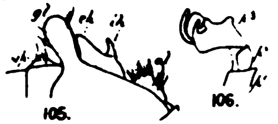


Micrathyria Hagenii

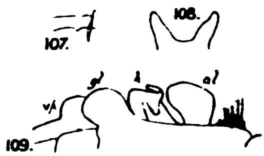




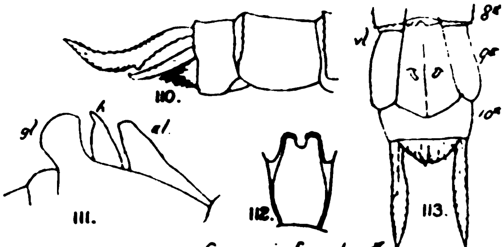
Micrathyria didyma



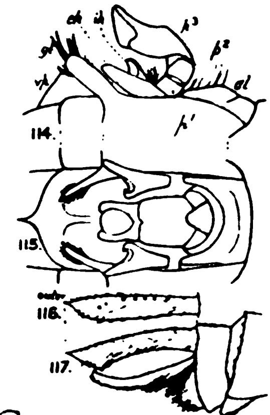
Mesothemis collocata



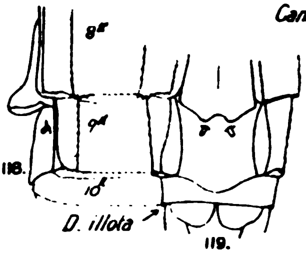
Micrathyria aequalis



Cannacria furcata ↗



Diplax illota



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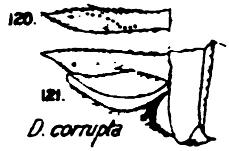
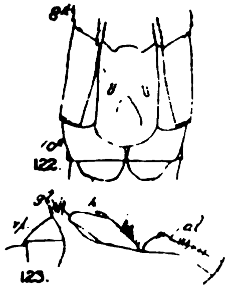
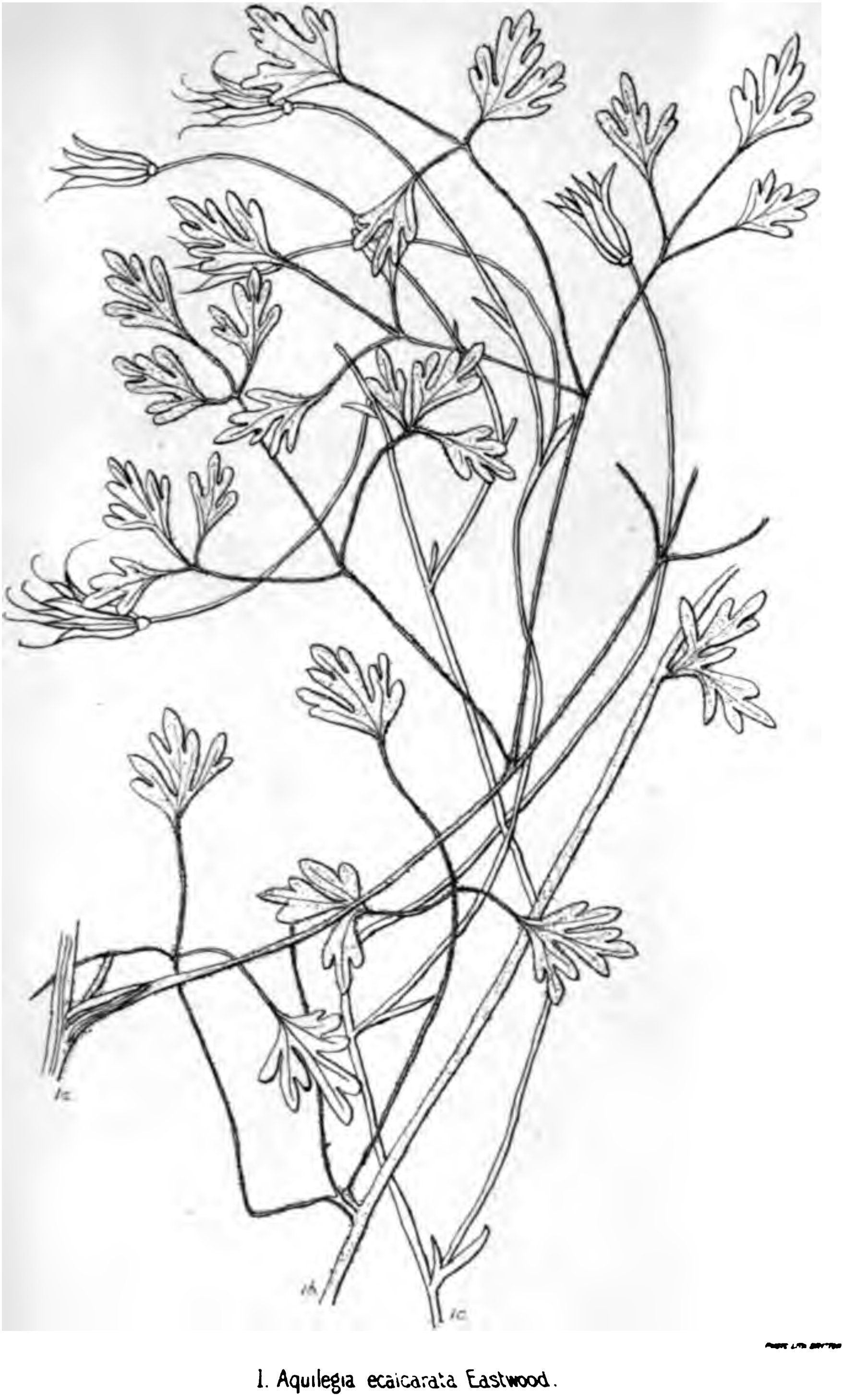


D. corrupta



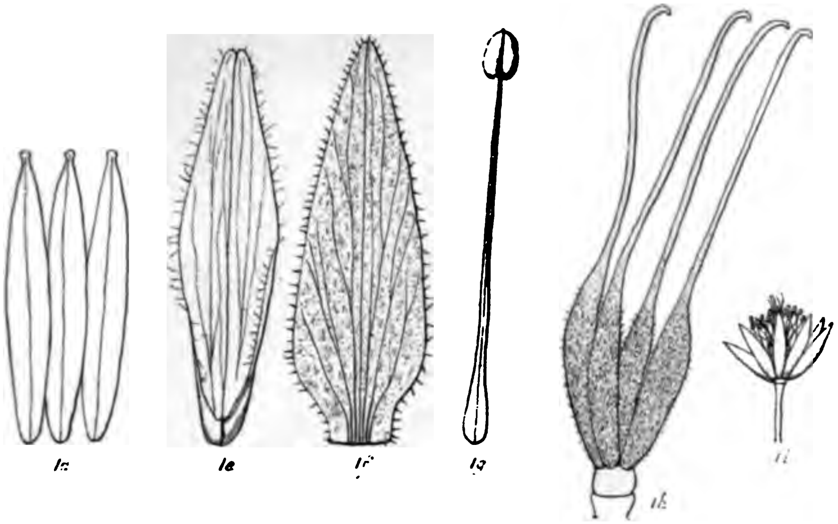
Diplax corrupta

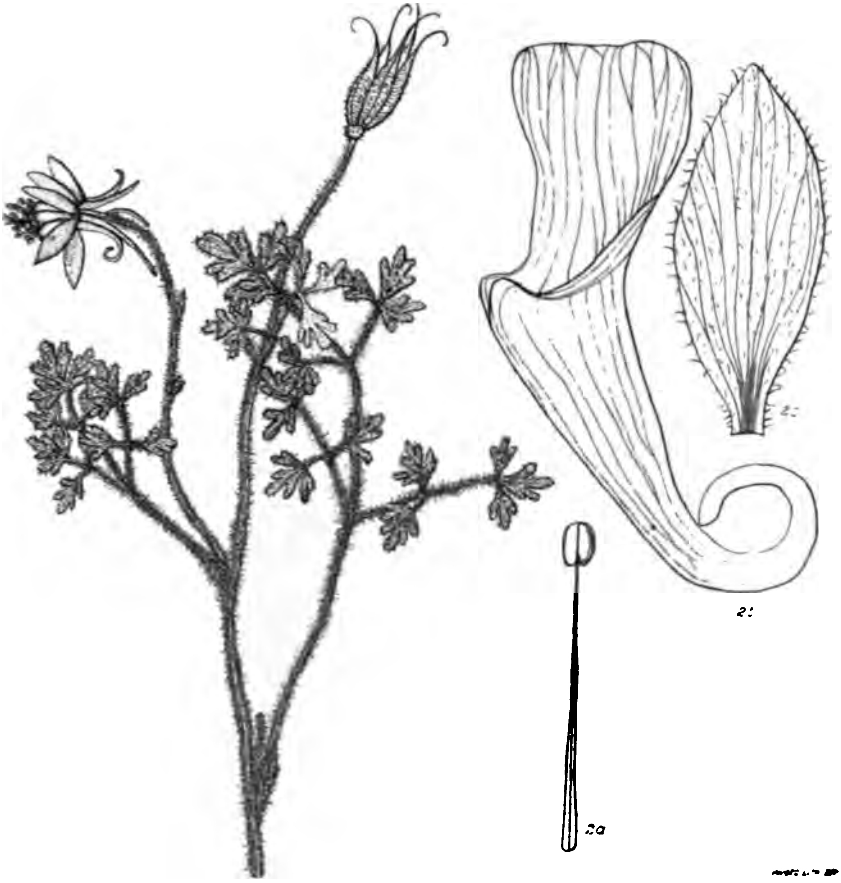
PLATE XVIII.



1. Aquilegia ecalcarata Eastwood.

PLATE XIX.





2. Aquilegia micrantha Eastwood.

PROCEEDINGS

OF THE

CALIFORNIA

ACADEMY OF SCIENCES.

SECOND SERIES.

VOLUME IV.

PART 1.

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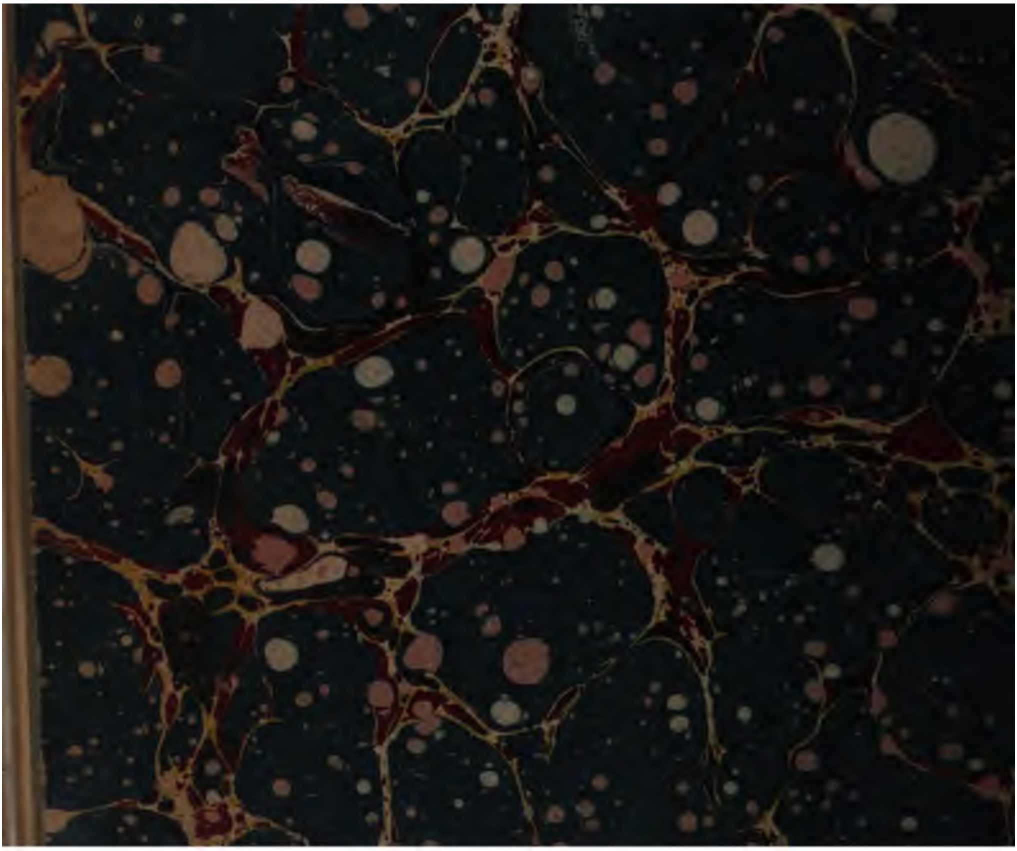

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